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Response to Posthypnotic Amnesia and Aphasia in Highly Hypnotizable and Simulating Subjects

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Abstract

Response to Posthypnotic Amnesia and Aphasia in Highly Hypnotizable and Simulating Subjects

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To test Spanos, Radtke, and Dubreuil's (1982) hypothesis that highly hypnotizable subjects strategically orient their responses to amnesia in line with the experimenter's demands, simulators (Orne, 1979) and subjects of stratified hypnotizability levels were administered a complex amnesia and aphasia suggestion for previously memorized words and their homonyms. Amnesia was assessed through free recalls and aphasia via word association tasks and reaction times. Both very high hypnotizable subjects and simulators displayed recall amnesia and associative impairments suggesting that a complex hypnotic suggestion for a combination of several memory deficits may disrupt both episodic and semantic memory functioning. Although both very high hypnotizable and simulating subjects demonstrated amnesia and aphasia, the two groups differed in the processes by which they displayed these suggested phenomena. Analyses were performed on the probability of critical target materials being elicited as first associates, as opposed to second or third associates, and on latencies of first associative responses. Both suggested that simulators, but not very high hypnotizables, may have been employing a more effortful, voluntary cognitive strategy during the word association task to meet the demands of the suggestions for amnesia and aphasia. The

results suggest that a social-psychological model of hypnotic amnesia does not provide a complete and sufficient account of hypnotic phenomena.

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frustrations accumulated during this long journey.

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Response to Posthypnotic Amnesia and Aphasia in Highly Hypnotizable and Simulating Subjects

Posthypnotic amnesia is a core phenomenon of hypnosis. It has variously been the focus of substantial interest, empirical investigation, theoretical speculation, and heated debate. The phenomenon consists of some subjects' apparent compelling inability to recall previous hypnotic events and experiences following a suggestion given during hypnosis that they will not remember those events after hypnosis has been formally terminated. Hypnotically induced amnesia is unique in the sense that it occurs within the context of one person talking to another (no head injury or pathology of brain cells is required for its occurrence).

One of the main characteristics of suggested posthypnotic amnesia is that it is reversible. The recovery of the forgotten material is usually obtained by a prearranged reversibility cue from the hypnotist which cancels the suggestion. Most investigators agree that subjects should be considered to be amnesic only if their failure to recall is reversed by the cancellation cue (i.e., only if target material. not recalled just a few moments earlier, is successfully recalled after cancellation).

Taking reversibility as part of an objective criterion of responsiveness helps differentiate the effects of normal forgetting from the impact of instructions for suggested forgetting. Reversibility shows clearly that subjects have attended to and processed the critical material during hypnosis, and that the corresponding memories have actually been encoded. If reversibility occurs, then the amnesia cannot be seen as a form of forgetting

since the memory traces obviously remain intact. Thus, hypnotically suggested amnesia appears to temporarily affect the retrieval of the critical memories but not their acquisition or storage. Furthermore, the use of reversibility as an index of posthypnotic amnesia permits the distinction between amnesia (i.e., initial amnesia and reversibility), pseudo amnesia (i.e., initial amnesia but no reversibility), partial amnesia (i.e., some initial amnesia and some reversibility), and nonamnesia (i.e., no initial amnesia and hence, no reversibility).

When posthypnotic amnesia is assessed on a standardized measure of hypnotizability, such as the Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C) of Weitzenhoffer and E. Hilgard (1962), a subject is considered amnesic if he/she has recalled three or fewer of the 12 hypnotic suggestions on the initial recall test, and recalls at least two new items on the reversibility test. Posthypnotic amnesia is experienced by only a small percentage of subjects volunteering for experiments. The reported percentage of subjects who respond to hypnotically suggested amnesia depends upon the particular criterion adopted. The general consensus among investigators, however, is that from 10 to 15% of the volunteer population is capable of experiencing suggested amnesia.

There appears to be interindividual variation in the manifestation of posthypnotic amnesia. While simulating subjects will tend to report not remembering anything, real amnesic subjects will, ordinarily, remember at least fragments of what occurred. Some report only incidental events such as a door slamming or the

phone ringing in the next room. Others will report only elements of the hypnotic induction such as the eye fixation and the relaxation. More commonly, subjects will report an event experienced in hypnosis, such as writing their name, their age, and the date without recalling that this occurred within the context of them being age regressed to eight years old. This, in turn, has led to much speculation involving various formulations regarding disruptions of episodic and semantic memory (Tulving, 1972). In addition, without wishing to pursue the ways in which this phenomenon of selective recall may mesh with more general theories of memory, it is of interest that suggested posthypnotic amnesia is not distressful, as are everyday instances of sudden memory disruptions (e.g., temporarily failing to remember someone's name or telephone number).

It has been noted further that subtle effects of posthypnotic amnesia may be observed even in subjects who recalled a moderate amount of their hypnotic experiences. For example, Bowers (1976) indicated qualitative differences between the reports of high and low hypnotizable subjects such as the use of the first-person singular and active voice by high hypnotizable subjects and the first-person plural and passive voice by low hypnotizable subjects. Furthermore, he noted that the reports of low hypnotizable subjects tend to be clearly detailed when contrasted with the vague, fragmentary, and generic recall of high hypnotizable subjects. After amnesia has been lifted, however, high hypnotizable subjects recall with ease and clarity (Evans, 1965).

A final point is that given its low incidence within the general population (from 10-15%) posthypnotic amnesia appears to reflect primarily the abilities of subjects. Like all hypnotic suggestions of high item difficulty (i.e., low pass percentages), posthypnotic amnesia can, however, be influenced by contextual cues. A striking example of this was provided by Braid (1855) who distinguished between hypnosis and hypnotic coma. The former was inferred when patients could only recall the events of a particular hypnosis session during a subsequent one. By contrast, hypnotic coma was used to describe the situation where the hypnotized patient could not recall the events of a hypnosis session, even during a subsequent session. This distinction was unique to Braid, and appears to reflect social-psychological aspects of his practice. Additionally, for both of these amnesias, a key aspect is that there was no subsequent recall of the hypnotic events during normal waking.

Subsequent 19th century investigators, in common with Braid, observed that amnesia was "spontaneous"; it was elicited without any suggestion to not remember. Such "spontaneous" amnesia appears, also, to reflect the shared beliefs of both patients and their doctors, and perhaps the society of the time, that amnesia "should" occur in this seemingly "spontaneous" manner (Laurence & Perry, 1988; Perry & Laurence, 1980). In contrast with Braid, however, these investigators were able to obtain waking recall of what was experienced in hypnosis, perhaps reflecting a shift in shared beliefs among patients and doctors.

This point becomes of especial relevance when discussing differences between current theorists on the relative influence of

subject abilities, contextual cues, beliefs, attitudes, sets, and motivations. For the present, it is sufficient to say that nowadays, posthypnotic amnesia is almost always elicited in response to a direct and specific suggestion, and rarely occurs spontaneously.

Classical Dissociation Theory

Initially, on the basis of compelling subjective reports of amnesic subjects, many earlier investigators assumed that posthypnotic amnesia involves a functional ablation of memory similar to that found in memory loss. The "functional ablation" hypothesis held that the material covered by the amnesia was isolated from and failed to interact with other information stored in memory (Cooper, 1972). This hypothesis predicted that the "forgotten" material would not produce interference effects on the recall of material not covered by the suggestion.

Posthypnotic amnesia is routinely assessed by means of a simple test of free recall. When the task is to actively remember the critical material, highly hypnotizable subjects typically show a gross impairment of memory. However, quite different results have been obtained under other forms of testing. Comparative analyses of recall and other measures of memory such as recognition, associative tests, savings in relearning, retroactive inhibition effects, and psychophysiological response to critical items have demonstrated that suggestions for amnesia affect various aspects of memory in different ways (Kihlstrom & Evans, 1979). Studies by Strickler and by Coors (reported in Hull, 1933) showed that subjects who could not recall material learned in hypnosis demonstrated

substantial savings in relearning the same material posthypnotically. Graham and Patton (1968) had subjects learn a list of adjectives in a waking state and another list in hypnosis. Amnesia was suggested for the list learned in hypnosis, and memory for the initial list was retested. A control group who did not receive the second list showed 87.3% savings in relearning the first list. The amnesic groups showed savings of only 54.8%. This figure was not significantly different from that of 45.5% showed by a group that learned both lists in the waking state without suggestion for amnesia. Even though the subjects reported that they did not remember the second list, the amnesia did not reduce the retroactive inhibition produced by this list. Contrary to the non-interference prediction, proactive and retroactive interference effects continue to occur in the presence of posthypnotic amnesia. Therefore, amnesic material is not functionally ablated; it continues to interact with other information stored in memory.

Williamsen, Johnson, and Eriksen (1965) determined the extent of the amnesia using traditional memory tests as well as relatively subtle and indirect measures of memory. High and low hypnotizable subjects learned a list of six familiar words under conditions of hypnosis, simulation, and control. Hypnotic subjects received a posthypnotic suggestion to forget the words. Simulating subjects were told that the experiment was concerned with how well people could simulate posthypnotic amnesia. The procedure administered to the hypnotized group was described to simulators and they were asked to act as if they had been hypnotized and given the posthypnotic amnesia suggestion. Control subjects learned the

words in a waking state and were not given instructions for amnesia. They served as a check for normal forgetting. An independent experimenter (blind to subjects' conditions) evaluated the amnesia using recall, partial word, word association, and word recognition tests. (The original data of the Williamsen et al. (1965) study are presented in Appendix A).

After awakening, subjects were first asked to recall as many words as they could from the list they had learned. Simulating subjects differed significantly from hypnotized and control subjects on the first recall test. They failed to report any of the words. They played their perceived role of good hypnotic subjects by complying literally to the amnesia instruction that they would not remember anything. High hypnotizable subjects in the hypnosis condition recalled significantly more words than the simulators but significantly fewer words than low hypnotizables in the hypnosis condition and control subjects. Control subjects recalled four times as many words as amnesic subjects. After the cancellation of the suggestion, amnesic subjects recalled significantly more words than during the amnesia test period. Their performance no longer differed from their control counterparts.

Williamsen et al. (1965) ingeniously set up a situation in which amnesic subjects showed that they somehow had access to the "forgotten" material. Twelve words, of which various parts of their letters were deleted, were flashed on a screen one at a time. Half of the words were covered by the amnesia suggestion (experimental words) whereas the control words had not been previously learned. Subjects were asked to guess what the words

were and to report their answers as quickly as possible. Neither the high nor the low hypnotizable subjects in the hypnosis condition differed significantly from the control subjects on the number of experimental and control words solved. Despite their initial recall failure, high hypnotized amnesic subjects were three times more successful in solving experimental words than they were in solving control words. No measurable effect of the amnesia suggestion was found. Their performance was not different from that of control subjects who had learned the experimental words in a waking state and had unimpaired memory on the initial recall test. Whether or not a subject was amnesic for previously learned words, these words were easier and took less time to recognize even in partial form than words not previously learned.

It could be argued that a task of free recall is a transparent measure of forgetting and subjects might easily fake the amnesia; by contrast, the partial-words technique appears to be less obviously a test of forgetting. The study of Williamsen et al. (1965), however, contains evidence against the claim that indirect measures of amnesia are more valid than direct ones because an indirect procedure makes it more difficult for subjects to pretend being amnesic. The behaviour of simulators provides very good data on the degree to which it is possible to appear amnesic on the partial words task. Simulators solved significantly fewer experimental words and took significantly more time to make their responses than the hypnotized and control subjects. They behaved as if they had not been previously familiarized with the experimental

words. The partial word task clearly provided cues to the simulators on how to appear amnesic on it.

In a subsequent phase of the Williamsen et al.'s (1965) study, a word association task (WAT) was administered following the partial word test. Subjects were instructed to respond as quickly as they could with the first word that came to mind. The stimulus words were the first associations given to the six experimental and six control words selected from the Russell-Jenkins Frequency Table (Tinker & Russell, 1958). Results on the WAT parallelled the results obtained on the partial word test. A "recency" effect attributable to prior exposure to the experimental words learned during the acquisition phase of the experiment was observed in all subgroups except the high hypnotizable simulating subjects. These simulating subjects generated significantly fewer experimental words as associates than the other subgroups (including the high hypnotizable subjects in the hypnosis condition). They also generated fewer experimental words than control words and required more time to generate experimental words than control words.

The fact that genuine hypnotic subjects did not behave like the simulators on the two indirect measures of memory argues against viewing their behaviour as motivated primarily by the desire to appear amnesic. If the desire to appear amnesic is discarded as the main motivation of amnesic subjects, then their behaviour on the direct recall measure can be viewed as a <u>real</u> inability to recall.

Following the WAT, subjects were administered a word recognition test. The six experimental words and the six control words were typed in random order on an index card. Subjects were

handed the card and asked "If you had learned any words while hypnotized, are there any words on this card which are words you could have learned?" The pattern of results on the recognition memory test was very similar to that found on the first recall test. High hypnotizable subjects in the hypnosis condition recognized fewer words than low hypnotizables in the hypnosis condition and control subjects. Simulating subjects failed to recognize any of the words. High hypnotizable subjects in the hypnosis condition spent more time on the recognition test than control subjects. Low hypnotizable subjects in the hypnosis condition did not differ from the control subjects. Simulators spent less time on this test than did the controls. Despite the previous failure of the high hypnotizable subjects in the hypnosis condition to show any effects of the suggested amnesia on the partial word test and the WAT, these subjects showed a significant impaired performance on recognition memory. The amnesic effect in the high hypnotizable subjects in the hypnosis condition, however, was smaller in magnitude than that shown by the simulating subjects.

It appears that a suggestion for posthypnotic amnesia can impair recall and recognition memory among high hypnotizable subjects but may not preclude the use of the "forgotten" material as responses. By contrast, simulators overplayed their amnesic role by showing a more general inhibition of the use of the words as responses in all memory tasks.

Bowers (1966) conducted a study that buttresses the position that posthypnotic amnesia is not some kind of fake forgetting. Subjects were given a posthypnotic suggestion to spontaneously

begin a series of sentences to Taffel cards with "he" or "they". Subjects further received a posthypnotic suggestion to be amnesic for these instructions. Simulators received the same suggestion preceded by instructions to behave as though they had been deeply hypnotized when they received the suggestion. No significant differences were found between the reals and the simulators' tendency to use "he" and "they".

Specific maneuvers were employed to convey the impression that the experiment was over (i.e., the subjects' behaviour was no longer monitored so there was no longer a need to simulate amnesia). Subjects were asked if they were willing to talk to a graduate student interested in their perception of the experiment. The graduate student was in fact another experimenter who probed the subjects' memory of "he" and "they". This second experimenter was blind as to which subjects were reals and which were simulators. All of the simulators acknowledged their use of "he" and "they" in generating sentences and testified that it was voluntary. Bowers concluded that the situational demands to maintain the appearance of amnesia had been successfully cancelled. Despite the removal of situational demands to appear amnesic, eight out of fourteen reals failed to recall their use of "he" and "they" to the Taffel task and twelve out of fourteen testified that their experimental behaviour was involuntary. Bowers concluded that "this information was not consciously available to them, they had genuinely, if temporarily, forgotten it" (Bowers, 1976, p. 45). Again, posthypnotic amnesia seems to make the recall of a word quite difficult. However, it seems to leave relatively unaffected the

ability to use the word as a response. From this Bowers (1976) and Cooper (1972) concluded that in posthypnotic amnesia, no matter how nonvolitional the forgetting of the target information may be, amnesia is not the same as never having known the target material in the first place.

Current Theoretical Controversy

Two schools of thought, the "internal-process" and the "social-psychological" models of hypnotic phenomena, dominate current thinking in hypnosis research[1]. While these two schools agree about some fundamental facts and observations that delineate the domain of hypnosis, there is continuing disagreement about how best to approach and understand hypnotic phenomena. The two models part ways in their emphasis on which variables are the most salient. The internal-process position focuses on the inner mechanisms underlying hypnotic responsiveness (i.e., the subjects' cognitive processes by which amnesia occurs) such as imagery/imagination, absorption, and dissociation. On this view, contextual cues, motives, attitudes, beliefs, and sets play a relatively minor role in determining whether or not a person will be amnesic. Subjects abilities are the main component. By contrast, the social-psychological model attempts to understand hypnotic phenomena through an analysis of the social context in which they occur. The emphasis is on interactions of external variables operating in the hypnotic setting with subject characteristics. Subject variables are not those of cognitive ability, however, but rather factors such as expectations and sets, motivation to please

the hypnotist or to play the role of good hypnotic subject. The model downplays ability factors and cognitive mechanisms. Major theoretical differences surrounding hypnotic amnesia revolve around the issue of whether it should be viewed as "happening" automatically or strategically.

Internal-Process Position: Neo-dissociation Model[2]

Internal-process theorists view hypnotic behaviour as qualitatively different from nonhypnotic behaviour. Based on the assumption that "genuine" hypnotic experiences are involuntary (or a mixture of both volition and nonvolition), these theorists have postulated mechanisms such as "dissociations among cognitive control systems" or the deployment of "amnesic barriers" to explain how, in highly hypnotizable individuals, the induction of hypnosis transforms what would ordinarily be deliberate actions into suggestion-elicited responses that are no longer under conscious or voluntary control (Hilgard, 1977a; 1979).

According to Hilgard's (1974; 1977a; 1977b; 1979) neo-dissociation model, suggestions administered to a hypnotized person can activate subsystems of control, which are partially and temporarily dissociated from higher level executive (i.e., voluntary and conscious) control systems. Consequently, hypnotically suggested behaviours are typically experienced as nonvolitional. Such "dissociated control" (Miller & Bowers, 1990) is not only the basis of hypnotic responsiveness but is revealed in everyday life in various action-slips (Norman, 1981; Reason, 1979; Heckhausen & Beckmann, 1990). For example, when a person dials a more familiar

telephone number instead of the intended one, a subsystem of control has been activated. Such dissociated control of thought and behaviour depends on a hierarchical model of the mind which assumes that different cognitive control systems can operate in relative independence from each other. Such functional independence is illustrated by the fact that "forgotten memories" can nevertheless affect thought and behaviour (e.g., Jacoby & Witherspoon, 1982). Schacter (1987) espouses the view that "implicit memories" influence thought and behaviour, even when they are not "explicitly" (consciously) recalled (i.e., implicit memories are dissociated from their conscious experience).

Amnesia as Disrupted Memory Processing: Internal-process theorists view hypnotic amnesia, in much the same manner that they view other instances of unequivocal failures of memory encountered everyday (e.g., the difficulty we have in remembering dreams or the events of early childhood, forgetting where we left our car keys, etc.); they see amnesia as being outside the person's volitional control and carried out automatically.

Kihlstrom (1978) asserts that a person's statement that he/she cannot remember something, and the evidence provided elsewhere that the memory has indeed been stored and makes contact with other ongoing cognitive processes, is not necessarily contradictory. The paradox of subjects' seeming to know, but at the same time not knowing is explained by comparing it to other findings in the memory literature which have shown that material can be available in memory storage but cannot be retrieved for recall.

According to this model, posthypnotic amnesia results from an inability to retrieve target material that remains available in memory storage. Because target memories have been temporarily dissociated from conscious control, they cannot be accessed voluntarily (Hilgard, 1974; 1977a; 1977b; Kihlstrom, 1978; 1983; Kihlstrom, Evans, Orne, & Orne, 1980; Kihlstrom & Shor, 1978).

Studies showing a defect in the temporal organization of recall (Evans & Kihlstrom, 1973; Kihlstrom & Evans, 1979) and in the organization of recall by taxonomic category (Spanos & Bodorik, 1977; Bodorik & Spanos, 1977) during hypnotic amnesia suggest that the disruption of the retrieval process may reflect subjects' apparent inability to use certain organizational cues and strategies. The reversibility cue presumably operates like other cues that facilitate recall (e.g., recognition cues).

Social-Psychological Model

The social-psychological model, on the other hand, views hypnotic behaviour as similar to other forms of social behaviour, and explicable without the need to infer internal processes. Proponents of this model view hypnotically suggested behaviour as strategic (i.e., goal-oriented), volitional (i.e., enacted deliberately), and reflecting subjects' interpretations of their situation and how they attempt to present themselves through their actions (Sarbin & Coe, 1972; 1979; Spanos, 1982a; 1982b; Wagstaff, 1981).

According to the social-psychological position, hypnotic behaviours are consciously intended, initiated, and controlled. The experience of nonvolition which frequently accompanies hypnotic

enactments, however, seems to contradict this view. To address this contradiction, social-psychological theorists point to the observation that although subject's reports of the hypnotic experience may be convincing, self-reports may not be valid mirrors of phenomenological experience. Spanos, Cobb, and Gorassini (1985) suggested that subjects are mistaken in interpreting their hypnotic behaviour as nonvolitional. "Good" (responsive) hypnotic subjects frequently behave as if they have lost control over their behaviour because preconceptions about hypnosis (e.g., expectations of unusual occurrences), the wording of hypnotic suggestions, and other cues in the hypnotic test situation define acting this way as central to the role of being hypnotized (Sarbin, 1984; Spanos, 1982b). This, in turn, leads these subjects to interpret their actions as involuntary. Subjects who interpret their hypnotic responses as involuntary experience them as such and report them accordingly.

The social-psychological position asserts that when hypnotic behaviour is consistent with the wording of suggestions, and when the subject reports any suggestion-related imaginings or other cognitive processes (e.g., goal-directed fantasy) consistent with the purpose described by the suggestion, the behaviour is regarded as actively, purposefully, and volitionally achieved, regardless of how the subject experiences it. The more involved the subject is in this fictive activity (imagining), the more likely he/she will experience a response as involuntary. This, it is argued, will make it more likely that the person will believe in his/her counterfactual report of nonvolition (imaginings) and accept the experience of nonvolition as "real" (Coe, 1989; Spanos & McPeake, 1974). In this view, the

experience of nonvolition is not part of hypnotic responding. Rather, it is an attributional error made by a person who remains unaware of the error (Spanos, 1986a).

In sum, the social-psychological model proposes that an ongoing cognitive effort (i.e., a strategic enactment) is required to achieve a hypnotic response. By way of contrast, the neo-dissociation model suggests that a hypnotic response does not require ongoing executive effort. It is set into motion by hypnotic suggestions which activate lower systems of control. Once activated the hypnotic response does not require a constant cognitive (i.e., executive) effort to maintain it.

Amnesia as Strategically Motivated Behaviour:

Social-psychological theorists have focused on the contradiction between subjects' assertion that they cannot remember and the evidence that the nonreported material is available and active in memory. Their account of hypnotic amnesia rests on the assumption that the amnesic subject "remembers" in some sense the critical information. Social-psychological theorists view hypnotic amnesia as a voluntary, goal-directed enactment. Amnesia is accomplished through a response strategy aimed at meeting the explicit and implicit experimental demands of the amnesia testing situation (Spanos,1986b). The motivation to forget flows from the desire to present oneself as a deeply hypnotized subject (Spanos & Radtke, 1982).

Hypnotic amnesia is achieved by conscious and intentional use of various strategies. From this vantage point, the majority of subjects who respond to hypnotically suggested amnesia are

deliberately trying to forget the target material. Subjects devise and implement diverse cognitive strategies that assist them in not remembering (e.g., subjects shift their attentional focus away from the task of list recall, engage in goal-directed fantasy about forgetting, etc.) or withhold their memory reports. Alternatively, subjects may do nothing to help themselves remember. The disruption of memory, for social-psychological theorists, is self-imposed by the subjects' actions. The social-psychological model argues that hypnotic amnesia occurs when a person tries hard to forget and succeeds. The internal-process model, on the other hand, proposes that hypnotic amnesia occurs when a person tries hard to remember and fails. These broadly defined emphases, or positions, in turn, generate a number of sub-issues on hypnotic amnesia on which further disagreements, of a primarily interpretative nature, are apparent. Such issues involve the stability versus modifiability of amnesic responsiveness.

Stability of Hypnotic Ability and Amnesic Response

Individual differences in hypnotic ability are crucial factors in delineating the domain of hypnosis (Hilgard, 1973). The reliability and stability of hypnotic ability as assessed on standardized scales are astonishing considering the fact that they are typically measured by scales containing no more than 12 hypnotic items. Even when investigators of different theoretical persuasions use different scales comprised of different hypnotic suggestions and different scoring procedures, the correlations between the scales is rarely below .60 (Bowers, 1983; 1976). When parallel forms of the

same scales are used, the correlation rises to about .90 (Hilgard, 1965). Longitudinal testing of hypnotic ability has further established its stability. Morgan, Johnson, and Hilgard (1974) reported a correlation of .60 between the hypnotic ability of Stanford undergraduates and their hypnotic ability measured ten years later. Piccione, Hilgard, and Zimbardo (1989) assessed 50 of the original 85 subjects of Morgan, Johnson, and Hilgard's sample a third time, 25 years after their initial test of hypnotic ability. From the first to the third testing, r = .71; from the second to the third testing, r = .82. Hypnotic ability seems clearly stable over extended periods of time.

For internal-process theorists, hypnotic responsiveness reflects a stable capacity for experiencing cognitive dissociations. From this perspective high hypnotizable subjects are more likely to experience hypnotically suggested amnesia than low hypnotizable subjects. Hypnotic amnesia is therefore not modifiable because nonamnesic subjects lack dissociative abilities.

Advocates of the internal-process approach do not deny that genuine increases in hypnotic ability can be achieved. They recognize the possibility that low hypnotic responsiveness may reflect defensiveness and concern over loss of control and that practice and increased familiarity with the hypnotist and the hypnotic procedure will help to overcome these initial apprehensions. Finally, it should be emphasized that a trait of hypnotic ability does not imply that hypnotic responsiveness is permanently fixed. Rather, it implies limits on the extent to which hypnotic responsiveness will improve as a function of experience. A

hypnotic "duffer" may demonstrate a genuine increase in hypnotic ability but will never be converted into a hypnotic "virtuoso", no matter how much he/she practices. In other words, these investigators maintain that it is not possible to train an initially nonamnesic subject to become amnesic.

Enhancement of Hypnotic Amnesia

Social-psychological theorists, on the other hand, claim that hypnotically induced amnesic behaviours can be learned through a skills-training program. The rationale underlying this belief is the observation that, although a suggestion for amnesia may be clear, the process by which it happens is often based upon ambiguous or conflicting messages. For example, amnesia suggestions often imply that subjects are to actively do something to forget (i.e., "I want you to forget the words"), but they also imply that forgetting will occur automatically and without subjects active participation (i.e., "The words will be completely gone from your mind"). They then go on to argue that the challenge to recall constitutes a second source of ambiguity. For response strategy theorists, individual differences in response to amnesia suggestions reflect subjects' alternative interpretations of the ambiguous and/or conflicting messages embedded in the suggestion.

According to these theorists, unresponsive subjects typically interpret the amnesia suggestion to mean that they should await its occurrence rather than enact it (Spanos, Robertson, Menary, & Brett, 1980). On the other hand, successful subjects, actively involved in their role of good hypnotic subjects, tend to interpret the amnesia

suggestion as an implicit request to actively bring about the suggested response. Consequently, these subjects voluntarily deploy their attention away from target-related retrieval cues during the amnesia recall trial. When given the cancellation signal, they refocus their attention on retrieval cues and recall the target material (Spanos, 1982a; Spanos & Radtke, 1982). These investigators claim that hypnotic amnesia can be enhanced by providing subjects with appropriate and unambiguous interpretations of the suggestion.

Spanos and his associates conducted a series of experiments to test their hypothesis. Spanos, Stam, D'Eon, Pawlak, and Radtke-Bodorik (1980), using subjects unselected for hypnotizability, explicitly instructed half of them pre-experimentally to interpret the amnesia suggestion as a request to consistently maintain their attention away from the target material and retrieval cues, even when challenged to recall, until they were given the cancellation cue. The remaining half were not told how to interpret the suggestion. They reported that over 75% of the informed subjects, contrasted to 36% of the uninformed subjects, could be brought to display at least some amnesia.

Spanos and de Groh (1984) gave high and low hypnotizable subjects two successive amnesia suggestions for a three taxonomic categories word list. One suggestion called for amnesia for the entire list. The other suggestion called for amnesia for the words in one category. High hypnotizable subjects demonstrated more amnesia than low hypnotizables on both suggestions. However, both high and low hypnotizable subjects who received explicit

instructions without hypnosis on how to direct their attention away from target material in order to meet the demands for forgetting showed as much amnesia on both tasks as the hypnotized highs, and more amnesia than the hypnotized lows. They concluded that clarifying the task as one requiring a strategy rather than a "happening" produced equal responsiveness for lows as for highs, with or without hypnosis.

Spanos, de Groh, and de Groot (1987) showed that low hypnotizable subjects trained on how to interpret the ambiguous aspects of hypnotic suggestions displayed significantly more amnesia than either low or high hypnotizables who were not trained. In addition, trained subjects were as likely as untrained highs to describe their experience as involuntary.

Spanos (1986a) views these findings as consistent with the hypothesis that hypnotic amnesia reflects the operation of response strategies. The findings of the above studies seem to suggest that task ambiguity is an important factor in hypnotic amnesia. Amnesia can be enhanced in low hypnotizable subjects when the ambiguity of the task is reduced, and the resulting experience is interpreted as involuntary. Bowers and Davidson (1991) provided a detailed critical appraisal of Spanos' methods for producing increases in hypnotic responsiveness. They stressed that Spanos' cognitive skills-training program clearly communicates to subjects that they should treat a hypnotic suggestion as a simple request to behave accordingly. Consequently, subjects enact the suggestions. These enactments, however, may not be experienced as subjectively real and involuntary. Alterations in subjective experience are critical

features of hypnotic responsiveness (Orne, 1966; Bowers, 1983). Bowers and Davidson (1991) raised the concern that treatment induced enhancement in hypnotic responsiveness may be more an index of increases in outward compliance to unambiguous external demands, and of expectations for increased responsiveness to hypnosis (in the absence of altered subjective experience), than of genuine increase in hypnotic ability.

Bates, Miller, Cross, and Brigham (1988) addressed the compliance issue. They showed that providing a false rationale for receiving Spanos' training program (e.g., telling subjects that the purpose of the experiment is to increase hypnotic susceptibility to see if imaging ability increases along with it) reduces the pressure to comply with the demand for increased hypnotic responsiveness when it is subsequently assessed, especially on those indices that tap subjective experience rather than overt behaviour. Further, Bates et al. (1988) demonstrated that increases in hypnotic responsiveness achieved immediately after training were not maintained four months later.

Breaching of Hypnotic Amnesia

In order to provide additional evidence concerning the credibility of posthypnotic amnesia, some researchers have attempted to "breach" or break down amnesia before the administration of the reversibility cue. Studies have varied substantially in their breaching manipulations. For example, Bowers (1966) designed an elaborate study to deceive subjects into believing that the experiment was over before amnesia was

cancelled. All subjects were high hypnotizables. Half were hypnotized when given the suggestion for posthypnotic amnesia. The remaining half were read the same suggestion while awake, then asked to pretend that they had been hypnotized when they heard it. All subjects showed high responsiveness to the suggestion with a second experimenter. Bowers then asked subjects to meet a third person who needed subjects for pilot data, but he did not administer the reversibility cue. He said "And listen, since we're all finished here, I want you to be completely honest with him, regardless of what I said before" (p. 45). All of the simulating subjects and 43% of the real subjects breached their amnesia. In addition, all of the simulators, but only 14% of the reals, rated their amnesia as voluntary. Bowers interpreted the persistence of amnesia in more than half of the real subjects as supporting the view that posthypnotic amnesia is a nonvolitional, as opposed to a strategic, enactment.

Kihlstrom et al. (1980) found that high hypnotizable subjects who met a criterion for initial amnesia did not respond differentially to various instructional demands to overcome amnesia (i.e., exerting extra effort to recall; being completely honest; or using temporal organization cue). Control subjects were asked to recall again without pressure to breach. Each of the breaching instructions led approximately half of the initially amnesic subjects to recall significantly more from the first to the second test of amnesia. Because the three breaching groups did not produce any increment in recall over and above that shown by the retest-control group, the results were interpreted as evidence that posthypnotic

amnesia was not breached. Coe (1989; 1978) prefers to interpret these results as showing that all four of the instructions breached amnesia.

Subsequent studies by Coe and his colleagues (Coe & Yashinski, 1985; Howard & Coe, 1980; Schuyler & Coe, 1981) found, contrary to Kihlstrom et al. (1980), that subjects attached to a putative lie detector or submitted to strong demands for honesty recalled more than retest-control subjects, supporting their hypothesis that stronger demands lead to more breaching. Breaching, however, was not complete. About half of initially amnesic subjects did not breach. Both breaching and control subjects who had rated their first recall attempt as being under voluntary control were more likely to show memory improvement on the second recall trial than those who had rated themselves as not being in control of their amnesic behaviour.

The most stringent demands on subjects to breach their amnesia have been employed by McConkey, Sheehan, and Cross (1980) and McConkey and Sheehan (1981). In both of these studies, the breakdown of amnesia was examined by showing subjects a videotape replay of the hypnotic events that they had experienced via applications of the Experiential Analysis Technique (EAT; Sheehan, McConkey, & Cross, 1978). The EAT is a technique developed to facilitate and inquire into subjects' retrospective recall of hypnotic events. It is an especially stringent test of the genuineness of posthypnotic amnesia since the situational demands are clearly for subjects to recall and report on the amnesic events.

McConkey et al. (1980) administered three recall tests to high hypnotizable subjects. The first recall was taken immediately following the termination of hypnosis and served to classify subjects as amnesic (subjects who reported no more than two hypnotic events) or nonamnesic. The EAT session was performed by an independent experimenter who was blind to subjects' amnesic status. Subjects were told that the video would help them remember. They were instructed to stop the videotape and to describe their experiences whenever they remembered anything. The second recall was taken after the viewing when the hypnotist returned, and the last recall was taken following the reversal of amnesia. The authors reported that almost half of the initially amnesic subjects maintain their amnesia even after viewing the videotape.

McConkey and Sheehan (1981) replicated and extended these findings. They added low hypnotizable simulators to the design to provide an objective, behaviourial index of the cue demands carried by the suggestion for posthypnotic amnesia. In addition, the amnesia instructions specified the exact duration of the suggestion (i.e., from the beginning of the session until waking up) to determine whether the maintenance of the amnesia was an artifact of the wording of the suggestion defined in the previous study.

The viewing of the videotape increased the recall of subjects, but hypnotically amnesic subjects still recalled significantly fewer events than did nonamnesic subjects. The intrusion of the reality of subjects' memory into their amnesia experience via the EAT led to the breakdown of amnesia for 37.5% of the initially amnesic

subjects. A similar proportion of simulators breached their amnesia. This finding indicated that cues for sustaining amnesia were present in the test situation.

Hypnotically amnesic, nonamnesic, and simulating amnesic subjects, however, differed considerably in their comments during the EAT. Real hypnotic amnesic subjects generally expressed their inabilities or difficulties in remembering the hypnotic events being depicted on the videotape whereas hypnotic nonamnesic subjects commented openly and freely on their hypnotic experiences. By contrast, simulating amnesic subjects generally reported that they could not remember the events that they were viewing and made little comments on either their reported recall difficulty or the nature of any material that they reported they could recall. The majority of simulators who breached their amnesia attributed their recall to the videotape playback and not to events in the hypnotic session. No hypnotic subjects attributed their recall to the EAT procedure. One third of hypnotic amnesic, but no simulating amnesic subjects, indicated that they were sometimes able to recall the physical events being shown on the videotape but not the sensations, feelings, and thoughts that accompanied those events. This distinction between the availability of memories for behaviour versus memories for subjective experiences was also spontaneously mentioned by 37.5% of amnesic subjects in the previous study.

Thus amnesia was maintained in many of the real amnesic subjects despite optimal cueing for retrieval and under conditions where suggestions for the period of amnesia were quite specific. Cognitive theorists have interpreted the persistence of amnesia

despite breaching manipulations as evidence that at least some hypnotically amnesic subjects lose voluntary control over memory retrieval processes. McConkey and Sheehan (1981) suggested that

> ... for hypnotic subjects the cognitive dissonance produced by viewing events for which they are amnesic may have produced a dissociation between the actual experience and the behaviourial event. This process may well parallel the process of dissociation reported by others in relation to phenomena such as source amnesia[3] (Evans, 1979), hypnotic analgesia (Hilgard & Hilgard, 1975), and trance logic[4] (Orne, 1959); the argument being that there are aspects of the hypnotic subject's experience that are split off from conscious awareness and that illustrate the existence of complex systems of cognitive control (p. 52).

Alternatively, they indicated that different encoding and retrieval mechanisms for behaviourial and experiential events may be implicated. The latter might be more affected by suggestions for posthypnotic amnesia.

Social-psychological theorists have interpreted differently the failure of many high hypnotizable subjects to breach amnesia completely. Spanos and Radtke (1982) hypothesized that subjects who fail to respond to breaching instructions, do so because they are committed to presenting themselves as deeply hypnotized and, for this reason, may ignore, reinterpret, or de-emphasize the intent of the breaching manipulations which, if followed, would compromise

this self-presentation. According to this interpretation, the complete recall of target items in the face of typical breaching manipulations would not only violate the role requirements for being deeply hypnotized, but would tend also to discredit subjects' previous failures to recall when challenged. For example, subjects whose recall improved after instructions to be honest or to try their best, are acknowledging that they had been dishonest or had not tried their best on the initial challenge trial. According to this view, breaching manipulations provide high hypnotizable subjects with an opportunity to further validate or legitimize their hypnotic role-playing.

Two studies have investigated the breaching of amnesia during hypnosis. Spanos, Radtke, and Bertrand (1984) hypothesized that high hypnotizable subjects would breach amnesia completely if they were convinced that this would be a sign rather than a counter-indication of deep hypnosis. They selected eight highly hypnotizable subjects who, in previous testing, had consistently described their hypnotic responses as involuntary and who failed repeatedly to breach amnesia despite exhortations to be honest. Subjects were hypnotized and informed that during hypnosis, their minds possessed two "hidden parts" that could be contacted by a cue. One "hidden part" remained aware of everything that occurred in their right hemisphere, while the other remained aware of everything in their left hemisphere, even if they could no longer consciously remember. Subjects learned a list of abstract and concrete words. Half had been informed before learning that abstract words were stored in the right hemisphere and concrete words in the left hemisphere; the

remaining subjects were given the opposite information. Subjects were given a suggestion to forget the list of words. All subjects were amnesic for the list. Before cancelling the suggestion the experimenter contacted each subject's right and left "hidden parts" and tested recall. The authors reported that when the experimenter contacted their "right hidden part", all subjects recalled all of their "right hemisphere" words but none of their "left hemisphere" words. When contact was made with their "left hidden part", the opposite pattern of recall occurred. Apparently, everyone breached amnesia completely when doing so supported a self-presentation as deeply hypnotized. Spanos (1986a) concluded that even highly hypnotizable amnesic subjects retain voluntary control over their retrieval processes and that it is inaccurate to describe these subjects as unable to remember.

Like Spanos, Silva and Kirsch (1987) view good hypnotic subjects as striving to present themselves as deeply hypnotized. They postulated that subjects' expectations for reinforcement largely determine the way they respond. They criticized Spanos et al.'s (1984) procedure of presenting the expectancy manipulation (hidden parts) during hypnosis on the grounds that their results could be interpreted in two additional alternative ways. First, it could be argued that the instructions temporarily created two dissociated cognitive systems, as Hilgard's neo-dissociation theory claims (Hilgard, 1974; 1977a; 1977b; 1979). Second, subjects may have "complied" with the instructions because these were interpreted as hypnotic suggestions.

Before b ing hypnotized, high hypnotizable subjects who demonstrated posthypnotic amnesia on previous occasions were told that while they were in hypnosis they would receive an amnesia suggestion for a list of words. Their memory for the word list would be tested subsequently, then they would be led into a "very deep hypnotic state". Half were informed that they would be able to remember even less in a deep state ("reduced" condition), and half were told that they would be able to remember even more in deep hypnosis ("enhanced" condition). Subjects learned a six-word list to criterion. They were hypnotized and administered an amnesia suggestion for the list. They were then tested for amnesia of the list (Recall 1), given a procedure for deepening hypnosis and tested again for memory of the list (Recall 2). The amnesia suggestion was cancelled and they were tested again (Recall 3) before hypnosis was terminated. Subjects in both conditions displayed equivalent performance when tested for amnesia (Recall 1) and after its cancellation (Recall 3). When tested after deepening hypnosis (Recall 2) however, subjects as predicted displayed the opposite behaviour; eight of the ten "enhanced" subjects breached amnesia completely, and eight of the ten "reduced" subjects remained totally amnesic.

These two studies were interpreted as demonstrating the strong effects that instructions can have on breaching amnesia. All, or nearly all, high hypnotizable amnesic subjects breached under conditions meant to change their expectations about how deeply hypnotized subjects respond.

To draw these two points together, there are data to suggest that by manipulating the expectations and interpretations conveyed to subjects in the testing situation, some researchers have been successful in augmenting hypnotic amnesia in low hypnotizable subjects who, according to internal-process theorists, lack the dissociative abilities required to perform this task. Furthermore, other expectancy and interpretational manipulations have led to an apparent "breaching" of amnesia in high hypnotizable subjects. These data, (particularly in the latter case) certainly draw attention to the powerful role that expectancy variables may play in shaping certain hypnotic outcomes. These data do not demonstrate with finality, however, that a high hypnotizable subject in hypnosis has total control of his/her cognitive processes. An alternative interpretation remains that, in these particular cases of "breaching", if a subject believes that "breaching" is an integral part of hypnotic behaviour, he/she will act in accordance with this belief. This appears to be no different from 19th century reports of "spontaneous" posthypnotic amnesia. The degree of control that the hypnotizable person in hypnosis exerts over his/her cognitive processes, and the degree to which behaviour experienced as involuntary actually is, remains an open question.

Episodic/Semantic Dissociation During Posthypnotic Amnesia

In an attempt to reconcile the paradoxical simultaneous availability and unavailability of memories, Kihlstrom (1980) suggested that posthypnotic amnesia involves a dissociation between what Tulving (1972) has labelled episodic and semantic

components of memory. Episodic memories are recollections of specific episodes of one's experience (e.g., the trip a person took last summer) and are encoded in a unique, spatiotemporal context. Semantic memories, which consist of knowledge that is independent of specific contexts (e.g., the facts of the world, the meanings of words, rules of mathematical and logical operations, etc.), are stored separately. According to Kihlstrom, posthypnotic amnesia disrupts episodic but not semantic memory. Failure to recall a word list learned in hypnosis following suggestion for amnesia represents a disruption of episodic memory. However, semantic memory contains representations, definitions, and associations of the list words, and these remain unaffected, or less affected, by the amnesia suggestion. Therefore, despite their failure to recall, amnesic subjects should be able to retrieve the "forgotten" words from semantic associates. According to Kihlstrom (1980), the semantic associates of the to-be-forgotten words are activated or "primed" during the original learning episode. Hence, despite the dissociation between episodic and semantic memory that is thought to lead to recall failure, interference effects may occur because of "a residual priming effect" of the original learning on subsequent tasks involving retrieval from semantic memory.

In order to test the hypothesis that posthypnotic amnesia disrupts performance on episodic but not on semantic memory tasks, Kihlstrom (1980) administered subjects a posthypnotic suggestion to forget a previously learned word list. High hypnotizables (SHSS:C score = 8-10, representing approximately 20% of the distribution in an unselected university student sample) and subjects of very high

hypnotizability (SHSS:C score = 11-12, representing approximately the top 5% of the distribution) exhibited a substantial amount of amnesia when challenged to recall. Following the recall trial subjects were given a word association test (WAT 1). Half of the stimuli on the WAT were designed to elicit the earlier learned list (i.e., critical) words as primary associates (e.g., if "thread" was a learned word, "needle" was presented on the WAT). The remaining stimuli were designed to elicit nonlist (i.e., neutral) words as associates. Subjects who showed amnesia on the recall task (episodic memory task) showed no associative impairments on the WAT (semantic memory task). Instead, they exhibited a "priming" effect of the original learning by generating the "forgotten" (critical) words as associates rapidly, efficiently, and significantly more often than neutral words. There were no differences in response latency between critical and neutral words. Following the WAT, but before cancellation of the amnesia suggestion, subjects were given a second recall trial. Despite their previous generation of the critical words as associates on the WAT, high and very high hypnotizable subjects continued to exhibit recall amnesia. Memory impairment was restricted to "episodic" tasks. That is, the amnesia suggestion did not disrupt the network of associations in semantic memory in which those words were embedded.

The posthypnotic amnesia suggestion was then cancelled, recall was tested once again, and a final word association test (WAT 2), identical to the first, was administered. Following the cancellation cue, amnesic subjects recalled almost all of the critical words (i.e., amnesia was reversed). Performance on WAT 2

was the same as on WAT 1. Kihlstrom postulated that posthypnotic amnesia represents a temporary dissociation of episodic (contextual) features from the generalized features of the memory traces, so that the subject has difficulty in reconstructing the spatiotemporal and experiential context in which the target events originally occurred.

Spanos, Radtke, and Dubreuil (1982) suggested that Kihlstrom's findings could be accounted for by response strategy instead of dissociation. They proposed that the standard amnesia suggestion used by Kihlstrom (1980) explicitly informed subjects that they would be unable to recall the target words but did not imply that they would be unable to generate these words in a testing context other than list recall. Thus, highly hypnotizable subjects may not have interpreted the WAT semantic task as relevant to their amnesic performance.

The authors cited the study of Williamsen et al. (1965) to buttress their position. They stated that both hypnotized and simulating subjects generated critical words as associates on the WAT administered during the period covered by the amnesia suggestion. They argued that, failure to give critical items as associates to a WAT is simple to perform if the demands to do so are conveyed clearly. The fact that simulators in the Williamsen et al. (1965) study generated critical associates during the amnesia test period indicates that they (and probably the real subjects as well) did not interpret the WAT as relevant to their amnesic performance.

Spanos et al. (1982), however, dismissed one important but puzzling result. In contrast to all other groups, high hypnotizable subjects instructed to simulate amnesia in the Williamsen et al.'s (1965) study generated fewer experimental words than control words. Furthermore, they needed more time to generate experimental words than control words. They failed to show a "priming" effect. In contrast, low hypnotizable subjects instructed to simulate amnesia performed like their hypnotized and control counterparts (i.e., they showed a "priming" effect). Thus, it seems that only high hypnotizable simulators construed the WAT as relevant to their performance as amnesic subjects. This finding is puzzling since both high and low hypnotizable simulators interpreted the preceding partial word test as pertinent to their amnesic performance.

Spanos et al. (1982) tested the hypothesis that subjects do not interpret the WAT as relevant to their amnesic performance. A group of subjects was given the standard amnesia suggestion used by Kihlstrom (1980) while another group received an alternate amnesia suggestion. The alternate suggestion asked explicitly for recall amnesia and further implied that amnesia would be shown on other memory tasks as well[5]. They found that very high hypnotizable subjects, who were given the standard amnesia suggestion, showed memory deficits only on the recall (episodic memory) tasks, thereby replicating Kihlstrom (1980). When the wording of the suggestion was altered, however, very high hypnotizable subjects exhibited memory deficits on both the recall tasks and the WAT; contrary to Kihlstrom (1980), both episodic and semantic memory were

impaired. These findings seem inconsistent with a dissociation hypothesis. Instead they tend to support the notion that hypnotic amnesia is a strategic enactment, determined by subjects' interpretation of the tasks requirements conveyed by the amnesia suggestion. Spanos et al. (1982) concluded that a dissociation between episodic and semantic components of memory is not an intrinsic aspect of posthypnotic amnesia.

The Present Study

The goal of the present study was to replicate Spanos et al.'s (1982) findings and to further test the hypothesis that highly hypnotizable subjects strategically orient their responses to amnesia in line with the experimenter's demands. Simulators (Orne, 1979), as well as subjects of stratified hypnotizability levels were administered a complex amnesia and aphasia suggestion for words and their homonyms. Amnesia is the inability to remember while aphasia refers to the inability to use language (motor aphasia) or the inability to understand speech (sensory aphasia). This suggestion was modeled upon Spanos et al.'s (1982) alternate amnesia suggestion. Its demands were, however, even more explicit than in Spanos et al.'s alternate suggestion. Amnesia was assessed through free recalls, and aphasia via WAT testing.

With respect to subjects' performance on the two measures of memory, four different outcomes were foreseen. The first possibility is based on Kihlstrom's (1980) hypothesis that posthypnotic amnesia represents a temporary dissociation between episodic and semantic components of memory. Subjects of low,

medium, and high levels of hypnotizability should demonstrate no memory deficits as a consequence of the suggestion for amnesia and aphasia because these subjects lack the required dissociative skills to experience the phenomenon. By contrast, very high hypnotizable and simulating subjects should show recall amnesia. As per Kihlstrom's prediction, very high hypnotizable amnesic subjects, like less responsive hypnotic subjects, should show no disruptions in WAT performance. Despite recall amnesia, real amnesic subjects should be able to elicit the critical words as associates as frequently and as rapidly on the WAT administered during suggested amnesia and aphasia (WAT 1) as on the WAT administered after cancellation of the suggestion (WAT 2). Simulating amnesic subjects, on the other hand, should respond to the explicit demands of the suggestion for amnesia and aphasia by generating fewer critical words as associates on WAT 1 than on WAT 2. Further, simulators should require more time to generate critical associates on the first administration of the WAT than on the second.

This outcome would support the internal-process account of hypnotic amnesia postulated by Kihlstrom (1980). Very high hypnotizable amnesic subjects cannot voluntarily access the critical material because they are temporarily unable to reconstruct the spatiotemporal context in which the target events occurred. Amnesic subjects, however, can retrieve the "forgotten" words via semantic associates.

The second alternative is based on Spanos et al.' (1982) response strategy hypothesis. Low, medium, and high hypnotizable subjects should not respond to suggested amnesia and aphasia

because these subjects lack the motivation to present themselves as deeply hypnotized subjects. By contrast, very high hypnotizables and simulators, actively involved in their role of good hypnotic subjects, should show similar memory impairments in terms of frequency and latency because the demands of the suggestion are explicit and unambiguous. This outcome would support the social-psychological account of hypnotic amnesia as being a voluntary strategic enactment based on subjects' interpretations of the experimental context and on how they attempt to present themselves through their actions.

The third alternative is based on previous studies (e.g., Williamsen et al., 1965) which have shown that simulating subjects have a tendency to overestimate the responsiveness of highly hypnotizable subjects by overplaying their amnesic role on all tasks where memory is evaluated. Simulators should overplay their perceived role of good hypnotic subjects by displaying more amnesia when challenged to recall and more aphasia on WAT 1, by showing lower critical item frequencies and longer response latencies than very high hypnotizable subjects. This outcome would contradict the social-psychological account of hypnotic amnesia since the amnesic and aphasic behaviour of highly hypnotizable and role-playing subjects would differ. Thus, the performance of genuinely responsive subjects cannot be seen as reflecting primarily their motivation to comply, or in terms of their interpretation of experimental demands inherent in the situation in which amnesia and aphasia responding is suggested and evaluated.

The last alternative is based on the hypothesis that a suggestion for amnesia and aphasia may impair both episodic and semantic aspects of memory processing. Accordingly, very high hypnotizable subjects may generate fewer critical items as associates on WAT 1 than on WAT 2 but, unlike simulators, may not require more time to elicit critical associates on WAT 1 than on WAT 2. That is, very high hypnotizable and simulating subjects may exhibit the same aphasic behaviour but these two groups of subjects may arrive at this behaviour via different routes. This outcome, again, would contradict the social-psychological account of amnesia. Instead, it would lend strong credit to an internal process view that highly hypnotizable subjects are capable of experiencing complex suggestions for a mixture of memory deficits without the assistance of conscious and intentional cognitive strategies.

Method

Subjects

A total of 50 volunteer subjects participated in the experiment (23 males and 27 females). Subjects ranged in age from 19 to 73 years. Subjects were either recruited from an introductory psychology class at Concordia University or through an advertisement in the university undergraduate newspaper (Appendix B). Subjects were administered the Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A) of Shor and E. C. Orne (1962), followed by the SHSS:C in a second individual session. On the basis

of their performance on the SHSS:C, subjects were classified as low (0 to 4), medium (5 to 7), high (8 to 10-)[6], and very high (10+ to 12) in hypnotizability. A quasi-control group of simulating subjects (0 to 2 on the SHSS:C) was added to Kihlstrom's (1980) design. There were ten subjects per group. Descriptive statistics for each group are presented in Table 1. All of the very high hypnotizable subjects had experienced the posthypnotic amnesia suggestion on the SHSS:C. Subjects in the simulator condition had been unable to respond to hypnotic suggestions. They had, therefore, never experienced posthypnotic amnesia. Following Orne's (1979) simulating instructions, these subjects were informed prior to the experiment that their task would be to simulate hypnosis and to respond as they thought good hypnotic subjects would respond. All subjects were told during a telephone recruitment that they would learn a short list of familiar words while hypnotized and that their memory for that material would be tested afterwards. No mention was made of the amnesia suggestion.

Hypnotizability Measures

Two standardized measures of hypnotizability, the HGSHS:A and a slightly modified version of the SHSS:C were used to assess hypnotic responsiveness. This modification consisted of replacing the anosmia to ammonia item with the posthypnotic suggestion item from the Stanford Hypnotic Susceptibility Scale, Form B (SHSS:B) of Weitzenhoffer and E. Hilgard (1959).

The HGSHS:A consists of 12 items of progressively greater difficulty and is administered on audiocassette to small groups of

Table 1

Descriptive Statistics

	SHSS:C	Age	Sex
Low			
M	**2.60**	**22.89**	4 males
SD	1.50	2.64	6 females
Medium			
M	**6.30**	**25.50**	6 males
SD	0.67	5.46	4 females
High			
M	**8.50**	**24.29**	3 males
SD	0.70	8.78	7 females
Very high			
M	**10.80**	**29.60**	4 males
SD	0.63	16.55	6 females
Simulator			
M	**0.60**	**26.00**	6 males
SD	0.84	3.82	4 females

from eight to ten subjects. The HGSHS:A is an initial screening device that gives a preliminary estimate of hypnotic responsiveness; at the same time it is designed to allay any possible apprehensions and misconceptions about hypnosis. Performance on this scale is evaluated by a retrospective assessment by the subject of his/her hypnotic response. Although the majority of subjects have been shown to be quite accurate at this task (Hilgard, 1965), some occasionally under, or overestimate their hypnotic performance. Moreover, the HGSHS:A correlates only moderately (r = 0.60) (Evans, 1979; Bowers, 1976) with the SHSS:C. This is because most of the HGSHS:A items are either easy or moderately difficult in terms of item pass percentages; it lacks a "top" of more difficult items found on the more stringent SHSS:C.

Unlike the HGSHS:A, the SHSS:C is individually administered and experimenter scored. Further, it has the advantage over all existing instruments of being more heavily loaded on difficult (i.e., low pass percentage) cognitive items such as positive and negative hallucinations and age regression. Cognitive items tend to index distortions of memory and perception which are considered to be the hallmarks of hypnotic responsiveness (Orne, 1959, 1980). These items distinguish high hypnotizable subjects from less responsive individuals. The HGSHS:A and the SHSS:C each take approximately an hour to administer, and their joint use provides a comprehensive evaluation of subjects' hypnotic abilities.

Subjects recruited from newspaper advertisements were given a consent form prior to their participation in the HGSHS:A

(Appendix C) and the SHSS:C (Appendix D) screening and before the experimental session (Appendix E). Subjects were paid $6.00 and $7.00 for their participation in the HGSHS:A and SHSS:C respectively. They then received $7.00 after completion of the 75-90 minute experimental session. Research method subjects underwent a similar procedure but were not paid for the initial HGSHS:A session. All testing was performed in English which was the mother tongue and language of early education (i.e., primary school) of most, but not all subjects[7].

Material and Apparatus

Two lists were prepared each consisting of seven stimulus words, and seven word associate responses. The majority of stimulus-response pairs were selected from the Russell-Jenkins Frequency Table (Tinker & Russell, 1958). The others were chosen from Palermo and Jenkins' (1964) study of word-association norms. The main criterion of selection was that each word associate be a homonym.

The two lists were matched with respect to their stimulus-response probabilities (i.e., they were prepared in such a way that each stimulus-response pair in one list was matched with a stimulus-response pair in the other list possessing an approximately equal stimulus-response probability). The two lists and their associated stimulus-response probabilities are presented in Table 2. The average stimulus-response probabilities were virtually identical (List 1: $\underline{M}$ = 0.35; List 2: $\underline{M}$ = 0.37).

Table 2

Comparison of Stimulus-Response Probabilities of Matched Lists

List 1

Homonym of Associate Response	Stimulus	Associate Response (i.e., Target Word)	P	
Fast, as in to go without eating.	Slow	Fast	(.75)	.63
Bye, as in goodbye.	Sell	Buy		.56
Nail, as in nailpolish.	Hammer	Nail	(.53)	.50
See, as in I can see you.	Ocean	Sea	(.23)	
Read, as in I read two books.	Green	Red	(.21)	
Note, as in writing a note to someone.	Music	Note	(.17)	
Hare, as in the animal that resembles the rabbit.	Head	Hair	(.13)	
			M = .35	

List 2

Homonym of Associate Response	Stimulus	Associate Response (i.e., Target Word)	P	
Light, as in the opposite of heavy.	Dark	Light	(.82)	
Bred, as in the man bred horses.	Butter	Bread	(.63)	.58
Thread, as in the thread on a screw.	Needle	Thread		.46
Piece, as in a piece of cheese.	Justice	Peace	(.25)	
Tow, as in a tow truck.	Foot	Toe	(.19)	
Son, as in I have one son and two daughters.	Moon	Sun	(.17)	
Train, as in she is in training for the Olympics.	Whistle	Train	(.09)	
			M = .37	

Items in the "Homonym of Associate Response" column of one of the list (the critical list) were memorized by the subjects in the acquisition phase of the experiment; during the word association task (WAT) phase, the 14 items in the "Stimulus" columns were presented as cues in an attempt to elicit the associate responses listed above, designated as target words.

(P)· Taken from the Russel-Jenkins Frequency Table (Tinker & Russel, 1958).

P : Taken from Palermo and Jenkins (1964).

Occasionally a same stimulus-response pair appeared in both sources but had different probability values. When this occurred, the lowest probability value was selected.

P Used for matching the two lists and the computation of the means.

The homonyms of the associate responses were then compiled into two lists, one of which was memorized during the acquisition phase of the experiment (the critical list) while the other (the neutral list) served as a control for learning. Each homonym of the word associate was followed by a brief explanation to ensure that subjects would learn the appropriate meaning. During the word association tasks, all 14 stimulus words were presented as cues in an attempt to elicit their associate responses (i.e., the target words).

A Sony videocassette recorder, model SLO-325 Betamax and FUJI videocassettes L-500 Beta 150m/492, a Sony video camera, model AVC 3250-Dx, an electro-voice microphone, and an AC 24 M phantom power supply 24 VDC at 70 mA were used to record each individual hypnosis session. A Sanyo AM/FM stereo double cassette-recorder, model A 225 and FUJI DR-I 90 minutes audiocassettes were used to record and play the list of words and the subsequent postexperimental inquiry. Portions of the experimental sessions were viewed on a Sony colour T.V., model KV 1931. Response latency was scored with a Micronta LCD quartz stopwatch.

Procedure

A schematic representation of the experimental session is presented in Table 3. The experimental session consisted of learning a list of seven words in hypnosis followed by an amnesia suggestion for these words. Subsequent to amnesia testing in hypnosis (Free Recall Test 1), the effect of the suggestion was

Table 3

Schematic Representation of the Experimental Session

Hypnotic induction

Acquisition phase: Subjects learned word list

Administration of the hypnotic amnesia suggestion

HYPNOTIC AMNESIA TESTING

Free Recall Test 1

Reinforcement of the amnesia & administration of the suggestions for posthypnotic amnesia and aphasia

Dehypnotization

POSTHYPNOTIC AMNESIA AND APHASIA TESTING

Free Recall Test 2

Word Association Task 1

Free Recall Test 3

Cancellation of the posthypnotic amnesia and aphasia suggestions

REVERSAL OF AMNESIA AND APHASIA TESTING

Free Recall Test 4

Word Association Task 2

reinforced, and posthypnotic amnesia and aphasia suggestions were administered. Hypnosis was then terminated and the suggestion for posthypnotic amnesia and aphasia was assessed over two free recall test periods. The first assessment came immediately after dehypnotization (Free Recall Test 2), and the second (Free Recall Test 3) after a word association task (WAT 1). The posthypnotic suggestion was cancelled and another free recall test was administered (Free Recall Test 4) followed by a second word association task (WAT 2).

All subjects were tested individually by two female experimenters. Subjects were recruited by an independent experimenter (E 1). At the beginning of the experimental session, each subject met with E 1 who gave him/her instructions. Simulating subjects received a slightly modified version of Orne's (1979, pp. 533-534) simulating instructions (Appendix F). The modification simply consisted of instructing simulators to act as if they were <u>good</u> hypnotic subjects instead of <u>excellent</u> hypnotic subjects. This modification was made so that simulators would not feel compelled to be perfect hypnotic subjects and to respond to all of the suggestions. Simulating and real (hypnotized) subjects spent the same amount of time (10 minutes) with E 1. After having read and signed a consent form, subjects were introduced to a second experimenter (E 2) who was blind to subjects' real or simulator status as well as to their hypnotizability level, thus avoiding any possible bias on experimental measures. E 2 performed the hypnosis, administered the memory and associative tasks, and scored the performance of subjects.

All subjects were administered the standard hypnotic induction procedure from the SHSS:C (Appendix G), followed by two deepening items (i.e., suggestions for arm levitation and arm rigidity). They were then instructed that a tape-recorded list of words would be presented once and that they should try to remember as many words as they could. Subjects in each group were equally divided and randomly assigned to either List 1 or List 2. Thus, for half the subjects, List 1 was the critical list; for the other half, List 2 was critical.

The recorded list of words was played once to the subject. Since each word possessed at least one homonym, each word was followed by a short description of its intended meaning (e.g., "Light" as in the opposite of heavy). The word was then repeated after its description. The word, its explanation, and its repetition were each separated by an interval of one second. Each of the seven words was separated by an interval of three seconds. The order of presentation of the words was randomized and then kept constant over all subjects. Following the presentation of the word list, subjects were asked to recall orally the individual words from the list. Subjects were given as much time as they needed to do this. If a subject omitted some words, the experimenter reminded him/her of the missing words and corrected errors if they occurred. This procedure was repeated until the subject met the criterion of two successive perfect recall trials.

Following criterion learning, subjects were instructed to remain deeply relaxed and to let themselves go deeper into hypnosis. They were then given an amnesia suggestion for the seven words.

Subjects were then asked to recall orally as many of the words as possible. They were given as much time as they required and they were not interrupted. If they came to an impasse, they were prompted twice to try again with nonleading comments such as "anything else?" and "take a few moments to see if you can remember anything else" until they reached a point where they acknowledged that they could not remember any additional words. This constituted the initial amnesia free recall trial (Test 1). This recall permitted assessment of the degree to which the hypnotic amnesia suggestion was effective in disrupting the recall of the words.

Before hypnosis was terminated, the effect of the amnesia suggestion was reinforced (regardless of previous response on Test 1). Subjects who showed partial or no amnesia were told that it sometimes takes a few moments before the amnesia reaches its full effect, and that the amnesia would get stronger as they continued to relax and went deeper into hypnosis, and that they would soon be amnesic to all of the words. Subjects who showed complete amnesia were told to continue to relax and to go deeper into hypnosis. It was emphasized that they would continue to forget all of the words.

All subjects were then informed that they would soon be awakened. Following this, suggestions for posthypnotic amnesia and aphasia were administered (Appendix H). This suggestion was modelled upon the standard posthypnotic amnesia suggestion used by Kihlstrom (1980) which informed subjects that they would be unable to remember the list of words after hypnosis. Subjects were

instructed that they would be totally unable to use either the words covered by the amnesia, or to use their homonyms. Instructions were as follows:

> You will continue to be amnesic for all of the words you learned. Not only will you continue to forget all of the words but you will also be amnesic to any words that sound the same as the ones you learned. You will be unable to say the homonyms of the words (i.e., words that sound the same but have a different meaning such as sail -as in sailboat, and sale -as in garage sale). For example, if you had learned the word tale, you would be unable to say the word tale as in story and you would also be unable to say the word tail as in the tail of an animal. The words, including what they sound like, will be completely erased from your memory. You will be unable to see the words, hear the words, pronounce the words, or their homonyms until I say to you "Now you can remember everything".[8]

Subjects were dehypnotized and then asked to describe orally everything that happened while they were in hypnosis. If a subject failed to mention having memorized a list of words, the experimenter specifically reminded him/her of it. They were then asked to recall orally any words which they remembered learning during hypnosis. Free recall continued until the subjects indicated

that they had reached an impasse. They were then reencouraged to remember with the same nonleading comments employed during Test 1. Again, subjects were given as much time as they required and they were not interrupted. This represented the second amnesia free recall trial (Test 2). Recall 2 permitted assessment of the degree to which the suggestion for posthypnotic amnesia and aphasia was effective in disrupting recall.

Next, the experimenter administered the word association task (WAT 1). As mentioned previously, half of the stimuli used in this test (i.e., the critical stimuli) had a relatively high probability of eliciting the critical target words (i.e., the homonyms of the seven words learned in hypnosis and covered by the suggestion for posthypnotic amnesia and aphasia) as associates. The remaining half (i.e., the neutral stimuli) had corresponding probability of eliciting the neutral target words (i.e., the homonyms of the seven unlearned words) as associates. The neutral stimuli served as control cues and were included to disguise the purpose of this test. This constituted the first test of aphasia.

The 14 stimuli were read aloud to each subject. Order of presentation was randomized and then held constant over all subjects with the exception that the first stimulus word read was from the neutral list and the second stimulus was from the critical list. The subjects were instructed to give three continued associations to each stimulus in order to maximize the likelihood that critical stimuli would elicit their intended target words. Subjects were asked to respond as quickly as they could with the first three words that came to mind.

Since WAT 1 afforded the amnesic subjects an opportunity to be reminded of some of those words which they had previously learned, subjects were administered another oral free recall test after the WAT. The procedure was identical to the previous recall trials. This constituted the third amnesia free recall trial (Test 3) and provided a test of the "reminder effect" produced by WAT 1 (i.e., it examined the possibility that eliciting the critical targets on WAT 1 facilitated recall).

Following Test 3 the experimenter administered the prearranged cancellation cue followed by a fourth oral free recall test. The procedure, again, was identical to the previous free recall tests. This fourth free recall trial (Test 4) provided a test of the reversibility of the suggestion for posthypnotic amnesia, and indicated the number of memorized words which remained accessible in memory after the suggestion had been lifted. This, in turn, was followed by a second administration of the word association task (WAT 2). The procedure was identical to the first administration of the WAT except that the stimuli were read in a different standard random order. This represented a test of the reversibility of aphasia.

A postexperimental inquiry, conducted by E 1, followed WAT 2 and concluded the session. Subjects were interviewed about their subjective experiences during the experimental session (See Appendix I for the questions asked during the inquiry), debriefed, thanked and paid for their participation.

The experimental procedures were modelled closely after those employed in Kihlstrom's (1980) first experiment, and in Spanos et al.'s (1982) experiment, the main differences being: 1) The inclusion of a group of simulating subjects; 2) the addition of two deepening items following the hypnotic induction; 3) a reduction in the number of words learned in hypnosis; 4) the effect of the amnesia suggestion being tested and reinforced in hypnosis; 5) the suggestion for posthypnotic amnesia and aphasia was more complex and explicit than Kihlstrom's (1980) standard suggestion or Spanos et al.'s (1982) alternate suggestion; and 6) the use of a postexperimental inquiry to elicit additional information about subjects' perceptions of the experiment, and their performance.

Results

The present study serves as both a replication and, more importantly, as an extension of Kihlstrom's (1980) and Spanos et al.'s (1982) experiments. For the purpose of replication, low, medium, high, and very high hypnotizable subjects were included in the study. In terms of extending the findings of these studies, a group of simulating subjects was added in the present design. The addition of the simulators allowed the assessment of whether or not the very high hypnotizable subjects could be behaviorally or/and subjectively distinguished from their simulating counterparts.

Because of the two disparate questions addressed by this thesis, two approaches were used in analyzing the data. In order to

assess the replicability of Kihlstrom and Spanos et al., the analyses on the WAT were performed on all five hypnotizability groups (Section A). In order to address the question of whether very high hypnotizable and simulating subjects could be distinguished behaviorally, the analyses on the WAT were performed only on these two groups of interest (Section B). The decision to exclude the low, medium, and high hypnotizable subjects from these latter analyses was based upon the hypothesis that these theoretically less important groups might be inherently more variable than the primary groups of interest. For example the group of high hypnotizable subjects (and possibly the group of medium hypnotizable subjects) might consist of some subjects who were capable of displaying hypnotic amnesia. These subjects would be pooled with other highly hypnotizable subjects who were incapable of experiencing this phenomenon. Thus, as a group, these subjects are likely to show more (within cell) variability than the very high hypnotizable subjects who should respond in a more homogeneous fashion. By excluding the theoretically less important groups, it was hoped to maximize the power of statistical discrimination between the very high hypnotizable and the simulating subjects, through the minimization of extraneous error variance.

Preliminary data screening revealed a number of statistical and theoretical anomalies within the data set. Since the main focus of this study involved the nature of hypnotically induced amnesia only simulating and very high hypnotizable subjects who were capable respectively of either simulating or experiencing this phenomenon were retained for the analyses on the WAT. Two very

high hypnotizable subjects (one male and one female -one from each list) and two simulating subjects (two females -one from each list) were excluded from the data set because they failed to demonstrate hypnotically suggested amnesia[9]. (Each of these subjects correctly recalled at least 6 of the 7 words on Tests 2 and 3).

In addition to these four subjects who were eliminated, one very high hypnotizable subject (assigned to List 1) was found to be a statistical outlier in terms of response latency (RL). This 73 year old subject took significantly longer than other subjects to produce associations to both critical and neutral stimuli on the two WATs. (For example, he required up to three minutes to elicit an association during WAT 2). This subject was therefore excluded from the RL analyses. Results of the recall trials will be presented first, followed by results of the WATs. (Individual scores for each subject on all variables are presented in Appendix J).

Performance on the Free Recall Tests

The number of correct words recalled was analyzed using a 5 x 4 split-plot analysis of variance with hypnotizability level (low, medium, high, very high, and simulator) as the between-subjects variable and the four free recall trials as the within-subjects variable. Means and standard deviations for the number of correct words recalled on each of the four recall tests for each group are presented in Table 4.

Significant main effects of both hypnotizability [$F(4,45) = 13.163$, $p<.001$] and recall tests [$F(3,135) = 31.253$, $p<.001$] were

Table 4

Group Comparisons of Amnesia

Variable		Hypnotizability level				
		Low	Medium	High	Very high	Simulator
Test 1						
	M	6.80	5.09	5.30	3.00	0.90
	SD	0.42	2.33	2.00	3.19	2.23
Test 2						
	M	6.60	6.09	4.90	1.30	1.50
	SD	0.69	1.91	2.46	2.75	2.91
Test 3						
	M	6.50	6.00	5.09	2.00	2.20
	SD	0 70	1.69	2.46	2.58	2.93
Test 4						
	M	6.60	7.00	6.30	6.50	6.50
	SD	0.69	0.47	1.25	0 70	0.52

Number of words recalled

found. More importantly, however, the interaction between these two variables was significant [$F(12,135) = 6.397$, $p<.001$].

An inspection of Figure 1 reveals that the source of this interaction is the different performance of very high hypnotizable and simulating subjects relative to their low, medium, and high hypnotizable counterparts. While no differences were found among the performances of low, medium, and high hypnotizable subjects across recall trials, simple main effects revealed that both very high hypnotizable and simulating subjects recalled significantly fewer words than low, medium, or high hypnotizable subjects on the first three recall trials. Furthermore, simulating subjects recalled statistically fewer words on Test 1 than very high hypnotizable subjects. Simulating and very high hypnotizable subjects, however, recalled an equivalent number of words on the second and third recall trials. These two groups of subjects showed no significant change in degree of amnesia across the first three recall trials. Finally, both groups showed amnesia reversal on Test 4 by significantly increasing the number of words recalled.

Performance on the Word Association Tasks

A. Analysis Performed with all Five Hypnotizability Levels

Number of target words: For each subject the number of critical and neutral target words was tabulated. (Critical target words refer to words given by the subject on the WAT that were homonyms of the words in the previously studied word list. Neutral target words were words produced on the WAT that were homonyms of words in a control word list that was not studied).

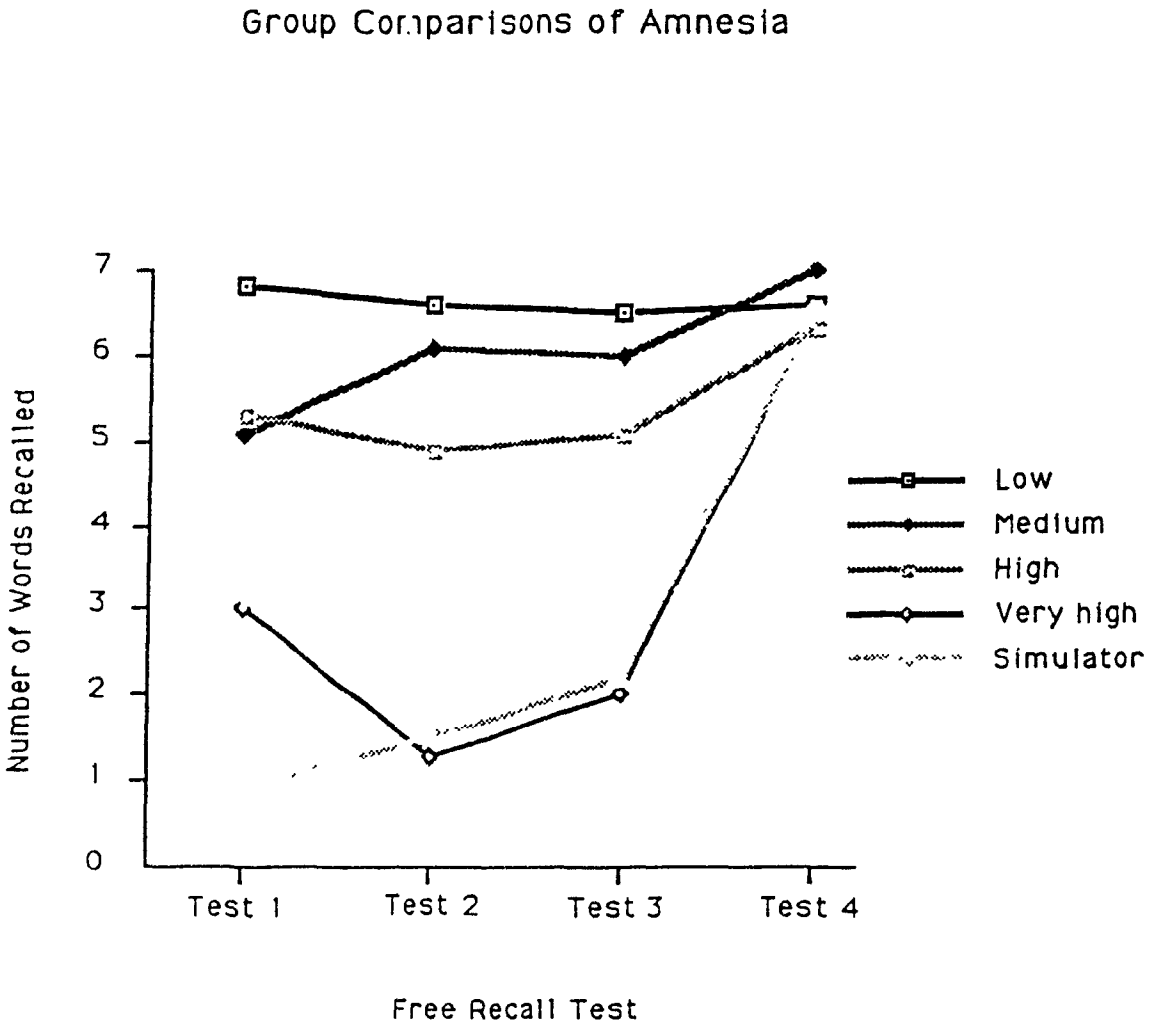

Figure 1. Number of words recalled on the four free recall tests for a list of seven words memorized during hypnosis. Test 1 occurred in hypnosis while Tests 2 to 4 occurred posthypnosis. Tests 1, 2, and 3 took place during suggested amnesia. Test 4 occurred after cancellation of the suggestion. WAT 1 was administered between Test 2 and Test 3.

The number of target words elicited as first associates was analyzed using a 5 x 2 x 2 split-plot analysis of variance with hypnotizability level (low, medium, high, very high, and simulator) as the between-subjects variable and the two WATs and the two types of target word (critical and neutral) as within-subjects variables. Means and standard deviations for the number of critical and neutral targets elicited as first associates on the two WATs for each group are presented in Table 5.

A significant main effect of WAT [$F(1,41) = 4.938$, $p=.03$] was found. The interactions between hypnotizability and WAT [$F(4,41) = 3.619$, $p=.012$] and between WAT and target types [$F(1,41) = 6.37$, $p=.014$] were also significant. Most important, however, the three-way hypnotizability by WAT by target type interaction was significant [$F(4,41) = 2.662$, $p=.045$].

An inspection of the upper panel of Figure 2 reveals a different pattern of results for low, medium, and high hypnotizable subjects than for very high hypnotizable and simulating subjects. While low, medium, and high hypnotizable subjects show no interaction between WAT and target types, very high hypnotizable and simulating subjects at least graphically appear to show this interaction. Simple interaction effects, however, revealed that this two way interaction was significant only for the simulators [$F(1,41) = 10.72$, $p<.01$]. Simple simple main effects revealed that the source of this simple interaction was due to simulating subjects generating significantly fewer critical targets on WAT 1 than on WAT 2. Very high hypnotizable subjects produced the same amount of critical targets on the two administrations of the WAT.

Table 5

Group Comparisons of WAT Performance

First Associates	Hypnotizability level									
Variable	Low		Medium		High		Very high		Simulator	
	Cri	Neu	Cri	Neu	Cri	Neu	Cri	Neu	Cri	Neu
No of targets										
WAT 1 M	2.60	2.09	1.80	1.20	1.90	1.50	1.62	2.37	0.75	2.25
SD	1.34	1.66	1 13	1.22	1.91	1.26	1.40	1.30	0 88	1.75
WAT 2 M	2.20	1.50	1.60	1.30	2.30	1.80	3.00	2.37	3.25	2.62
SD	1.61	0.84	1.17	1.56	1.41	1.31	2.13	1.68	1.98	1.84
No of targets + intrusions										
WAT 1 M	2.80	2.20	1.90	1.40	2.20	1.60	1.75	2.87	0.87	2.25
SD	1 22	1.68	1.28	1.34	2 48	1 34	1 38	1 64	0 99	1.75
WAT 2 M	2.40	1.60	1.60	1.60	2.70	1.90	3.62	2.62	3.50	2.75
SD	1.42	1.07	1.17	1.71	1.76	1.44	2.06	1.92	1.92	1.83
RL (in seconds)										
WAT 1 M	2.46	3.56	2.18	2.49	2.75	2.19	2.11	1.89	3.30	3.17
SD	1 77	3.76	0.73	1 75	2.31	0.90	0 54	0.53	2.09	2.16
WAT 2 M	2.07	2.33	2.16	2.17	1.86	1.88	1.84	1.86	1.90	2.23
SD	1.26	1 57	0.92	0.73	0.54	0 62	0 56	0 55	0 98	1 34

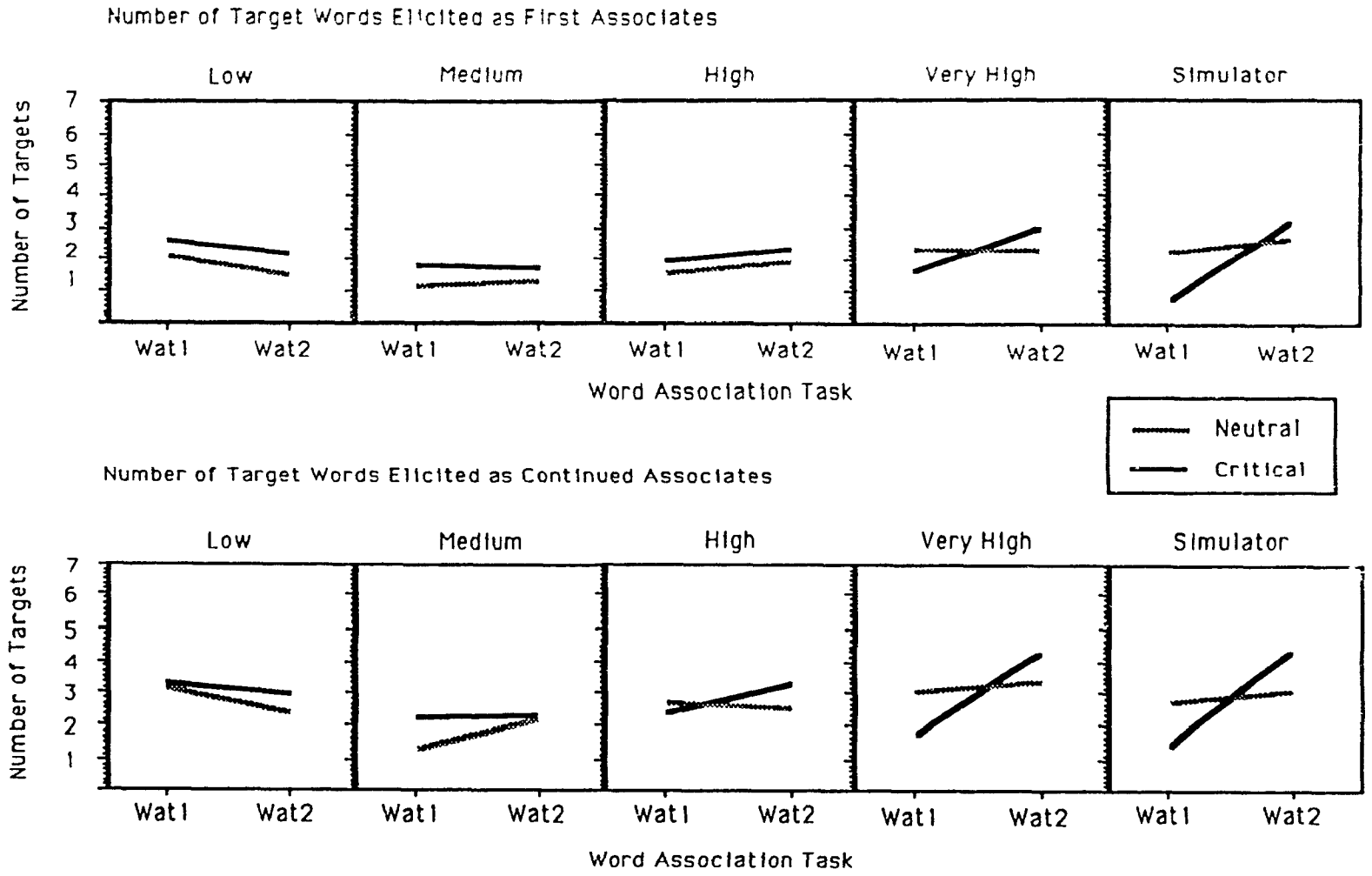

Figure 2. Number of critical and neutral target words elicited on the two administrations of the word association task for each group.

Number of target words plus intrusions: During the WATs, subjects occasionally produced a target word as an associate response to a stimulus that was not intended to elicit it. Such responses are referred to as "intrusions". For instance, a subject who had learned List 2 during the acquisition phase may have responded to the critical stimulus "Moon" with the expected association "Sun", followed by "Light". The expected response "Sun" was scored as a critical target while "Light" was scored as a critical intrusion since it was intended to be elicited by the critical stimulus "Dark". Such critical intrusions have a neutral list counterpart in that sometimes a homonym of one of the control words in the neutral list was unexpectedly elicited as an associate to a stimulus not intended to provoke it.

The number of target words plus intrusions elicited as first associates was analyzed using a 5 x 2 x 2 split-plot analysis of variance with hypnotizability level (low, medium, high, very high, and simulator) as the between-subjects variable and the two WATsand the two types of target as within-subjects variables. Means and standard deviations for the number of critical targets plus critical intrusions and neutral targets plus neutral intrusions elicited as first associates on the two WATs for each group are presented in Table 5.

A significant main effect of WAT [$F(1,41) = 5.922$, $p=.018$] was found. The interactions between hypnotizability and WAT [$F(4,41) = 3.774$, $p=.01$] and between WAT and target types [$F(1,41) = 8.366$, $p=.006$] were also significant. Most important, however, the three-way hypnotizability by WAT by target type interaction was significant [$F(4,41) = 3.592$, $p=.013$].

An inspection of the upper panel of Figure 3 reveals once again a different pattern of results for low, medium, and high hypnotizable subjects than for very high hypnotizable and simulating subjects. While low, medium, and high hypnotizable subjects show no interaction between WAT and target types, very high hypnotizable and simulating subjects show this interaction. Simple interaction effects revealed that this two way interaction was significant for both the very high hypnotizable [$F(1,41) = 9.63$, $p<.01$] and the simulating subjects [$F(1,41) = 9.7$, $p<.01$]. Simple simple main effects revealed that the source of this simple interaction was caused by very high hypnotizable and simulating subjects generating significantly fewer critical targets plus critical intrusions on WAT 1 than on WAT 2.

Response latency of first associates: For each subject, RL scores were determined by calculating the mean of individual latencies of responses to critical and neutral stimuli respectively. RLs were derived from audiotaped records of the experimental session.

The latencies for producing first associations was analyzed using a 5 x 2 x 2 split-plot analysis of variance with hypnotizability level (low, medium, high, very high, and simulator) as the between-subjects variable and the two WATs and the two types of target as within-subjects variables. Means and standard deviations of first associate latencies (in seconds) to the critical and neutral stimuli on the two WATs for each group are presented in Table 5.

A significant main effect of WAT [$F(1,40) = 8.794$, $p=.005$] was found. This can be seen in the upper panel of Figure 4. Subjects took

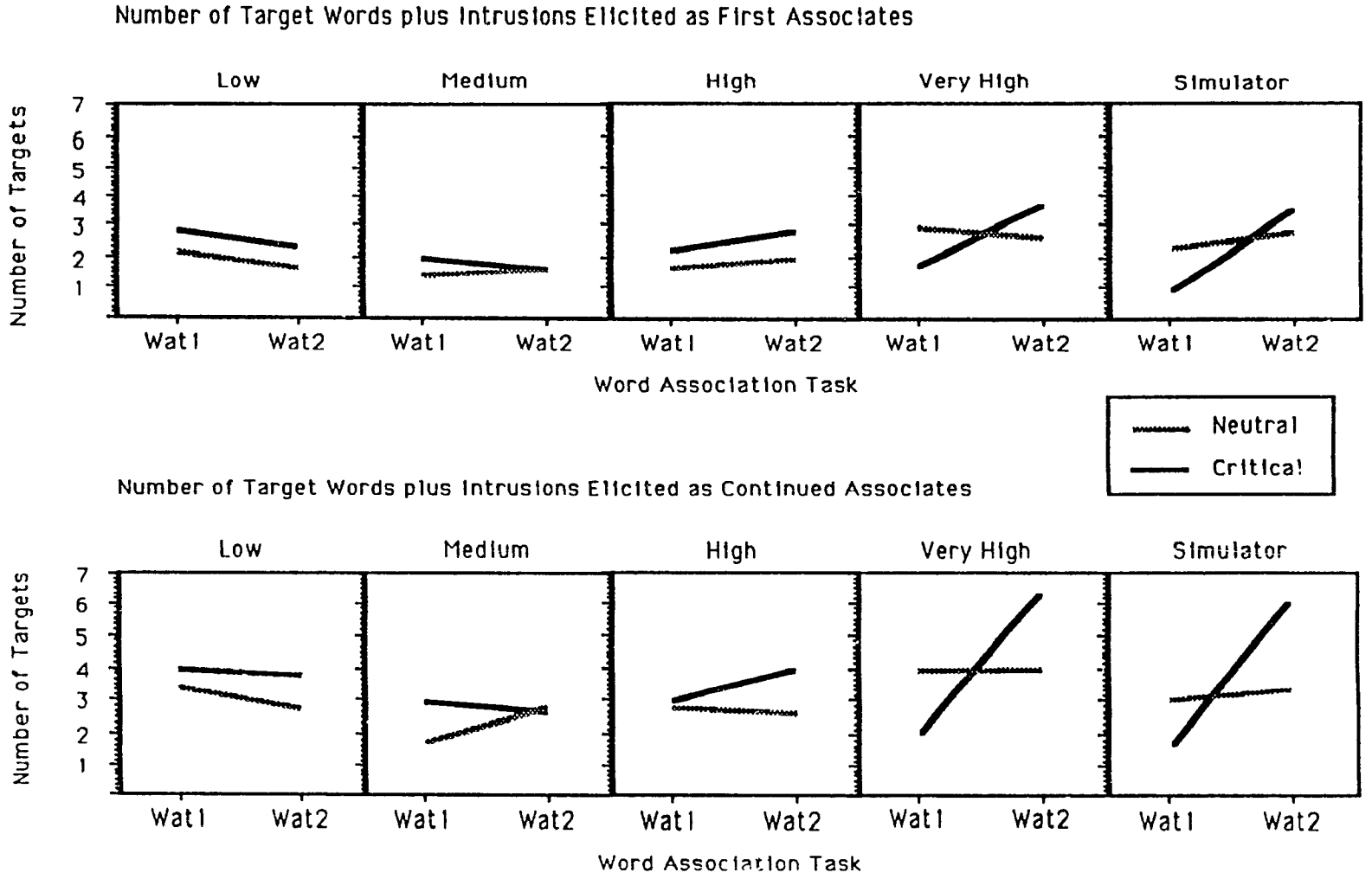

Figure 3 Number of critical and neutral target words plus intrusions elicited on the two administrations of the word association task for each group

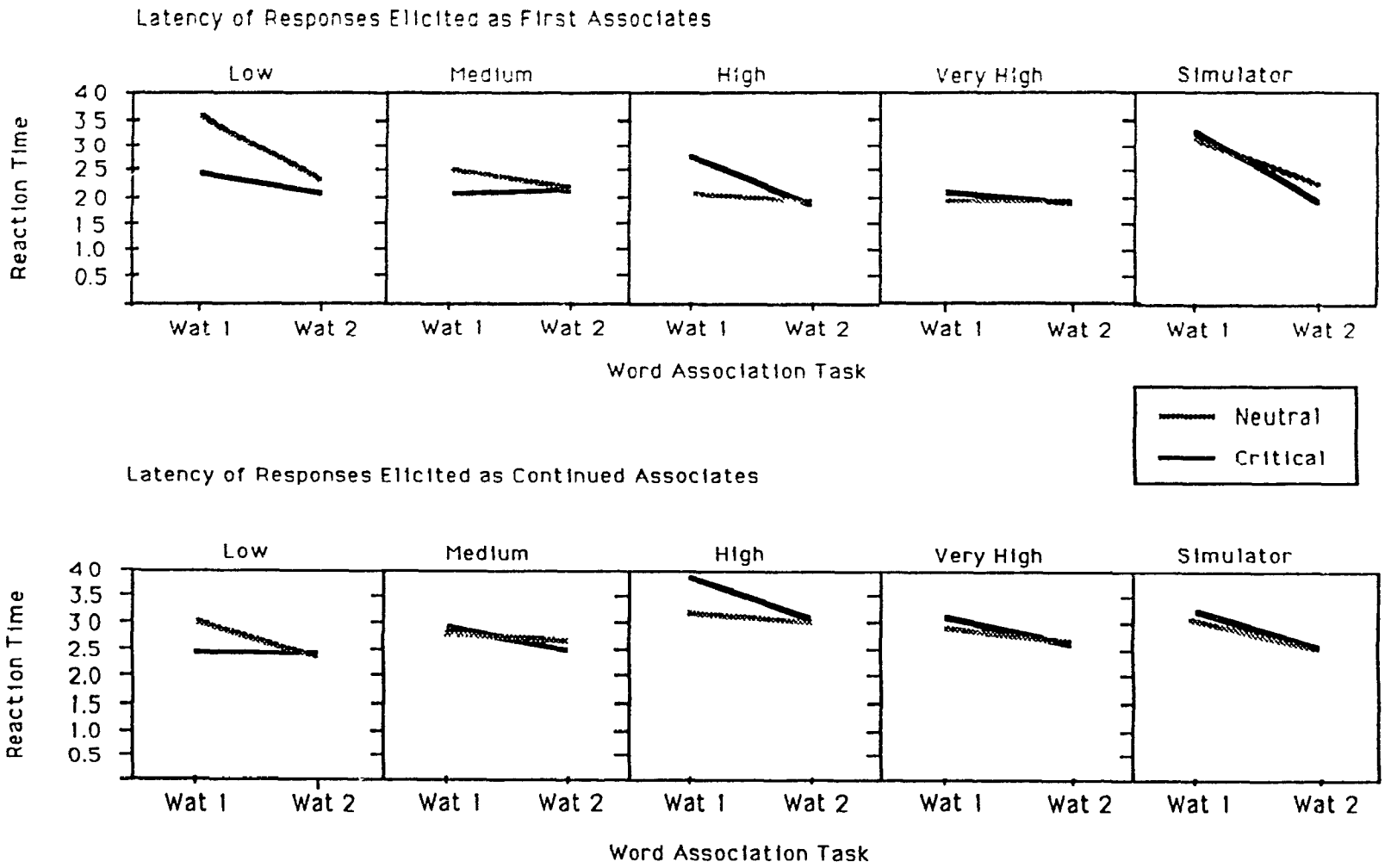

Figure 4. Latency of responses (in seconds) elicited to the critical and neutral stimuli on the two administrations of the word association task.

significantly more time to elicit first associates on WAT 1 (M = 2.625 sec.) than on WAT 2 (M = 2.042 sec.).

B. Analysis Performed with the Very Highs and Simulators Only

Number of target words: The number of target words elicited as first associates was analyzed using a 2 x 2 x 2 split-plot analysis of variance with the two hypnotizability levels (very high and simulator) as the between-subjects variable and the two WATs and the two target types as within-subjects variables.

Both the main effect of WAT [F(1,14) = 7.619, p=.014] and the interaction between WAT and target types [F(1,14) = 12.529, p=.003] were significant. This can be seen in the two main comparison groups (i.e., the very high hypnotizable and simulating subjects) located at the extreme right of the upper panel of Figure 2. Newman-Keuls post-hoc multiple comparisons indicated that the number of neutral targets elicited on WAT 1 (M = 2.31), on WAT 2 (M = 2.495),and the number of critical targets elicited on WAT 2 (M = 3.125) did not differ significantly from each other but, were significantly larger than the number of critical targets elicited on WAT 1 (M = 1.185).

Number of target words plus intrusions: The number of target words plus intrusions elicited as first associates was analyzed using a 2 x 2 x 2 split-plot analysis of variance with the two hypnotizability levels (very high and simulator) as the between-subjects variable and the two WATs and the two target types as within-subjects variables.

The main effect of WAT [F(1,14) = 9.239, p=.008] and the interaction between WAT and target types [F(1,14) =18.143, p=.001]

were significant. The performances of the two groups of interest (i.e., the very high hypnotizables and the simulators) are located at the extreme right of the upper panel of Figure 3 Newman-Keuls post-hoc multiple comparisons indicated that the number of critical targets plus critical intrusions elicited on WAT 1 ($\underline{M}$ = 1.31) was significantly smaller than the number of neutral targets plus neutral intrusions elicited on WAT 1 ($\underline{M}$ = 2.56) or on WAT 2 ($\underline{M}$ = 2.685). The latter did not differ significantly from each other but were significantly smaller than the number of critical targets plus critical intrusions elicited on WAT 2 ($\underline{M}$ = 3.56).

Number of critical target words plus critical intrusions elicited on WAT 1 but not reported during the previous amnesia test: A comparison was performed between the performance of very high hypnotizable and simulating subjects in terms of whether critical targets plus critical intrusions elicited on WAT 1 were given as first or as second or third associates. (All words in this comparison were critical items that were elicited on WAT 1 but not recalled during the preceding amnesia free recall trial).

This comparison revealed that for the very high hypnotizables 87.5% (14/16) of critical targets plus critical intrusions were given as first associates and 12.5% (2/16) were given as second or third associates. For the simulators, critical targets plus critical intrusions were given as first associates 53.85% (7/13) of the time and as second or third associates 46.15% (6/13) of the time. Thus very high hypnotizable subjects show a different pattern of responding [$\underline{X}^2$ = 4.06, $\underline{p}$<.05] than their simulating counterparts in terms of the likelihood that critical material will be elicited as first rather than as second or third associate on WAT 1.

Response latency of first associates: The latencies for producing first associations was analyzed using a 2 x 2 x 2 split-plot analysis of variance with the two hypnotizability levels (very high and simulator) as the between-subjects variable and the two WATs and the two target types as within-subjects variables.

The main effect of WAT [$F(1,13) = 9.001$, $p=.01$] and the interaction between hypnotizability and WAT were significant [$F(1,13) = 5.458$, $p=.034$]. The performances of the two main comparison groups (i.e., the very high hypnotizable and simulating subjects) are located at the extreme right of the upper panel of Figure 4. Spjotvoll and Stoline's modification of the Tukey HSD test (for unequal but similar sample sizes) indicated that the very high hypnotizables' first associate latencies on WAT 1 (M = 2 sec.), on WAT 2 (M = 1.85 sec.), and the simulators' first associate latencies on WAT 2 (M = 2.07 sec.) did not differ significantly from each other but were all significantly faster than the simulators' first associate latencies on WAT 1 (M = 3.24 sec.).

Response latency of critical targets: Because subjects could not be depended upon to elicit equivalent numbers of critical target words as associates, difficulties were encountered in parametrically assessing whether very high hypnotizable and simulating subjects differed in terms of the latencies required to elicit such responses.

These potential differences were therefore evaluated using a non-parametric measure that was tolerant of unequal numbers of observations among the cells of interest. Tests using the Mann-Whitney U statistic revealed no significant differences between

very highs and simulators on either WAT 1 or WAT 2 (all p values > .10 and are presented in Table 6).

Analysis Performed with all Three Associations

As mentioned previously, subjects were asked to give three successive associations to the stimuli of the WAT. As in Kihlstrom's (1980) and Spanos et al.'s (1982), analyses were performed looking at only first associates and were repeated including all three associate responses. Results of analyses performed on all three associations (or on second and third associations alone) either paralleled the results of analyses performed on first associations or did not yield any main effects of hypnotizability or interaction involving this variable. They are omitted here to avoid redundancy.

Discussion

A survey of previous research snows that subjects capable of responding to hypnotically suggested amnesia for a memorized word list will show deficits in both recognizing and recalling list items. Such deficits dissipate following the cancellation of the amnesic suggestion. Indirect measures of lexical processing such as stem completion and word association tasks indicate, however, that unrecalled items still were capable of influencing the manner in which subsequent material was processed (i.e., amnesic subjects demonstrated a "priming" effect). Such findings led Kihlstrom (1980) to postulate that in experiments where it is suggested to

Table 6

P Values associated with Mann-Withney U Statistics on the Response Latencies of Critical Targets between Very High Hypnotizable and Simulating Subjects

RL of critical targets elicited as first associates

on WAT 2 [U = 22, p = .268]

on WAT 1 [U = 17, p = .469]

RL of critical targets + critical intrusions elicited as continued associates

on WAT 2 [U = 19, p = .168]

on WAT 1 [U = 9, p = .452]

RL of critical targets + critical intrusions elicited as first associates

on WAT 2 [U = 24, p = .347]

on WAT 1 [U = 15, p = .535]

RL of critical targets elicited as continued associates

on WAT 2 [U = 17, p = .116]

on WAT 1 [U = 8, p = .365]

subjects that they will not be able to remember a previously learned word list, the hypnotic suggestion serves to selectively disrupt episodic memory, leaving semantic memory intact.

It must be noted that Kihlstrom (1980; 1985) realized that the cognitive site of disruption was entirely dependent on the wording of the hypnotic suggestions. That is, he recognized that hypnotic suggestions could be tailored to induce disruptions in semantic memory as well as episodic memory. He postulated that a disruption of semantic memory would result in a kind of agnosia for learned words in which subjects would show an inability to attach any kind of meaning to a given word, and that such semantic memory disruptions could be reflected by phenomena such as aberrant word association responses.

Unfortunately, Spanos et al. (1982) ignored this particular contention of Kihlstrom and interpreted the findings of his 1980 study as showing that all hypnotic amnesia suggestions worked exclusively on episodic memory. Using this restrictive interpretation, Spanos et al. (1982) reasoned that if an amnesia suggestion could be devised that influenced both episodic and semantic memory, then Kihlstrom's notions would have to be discarded in favour of a more social-psychological interpretation of hypnotic amnesia. Accordingly, Spanos et al. (1982) devised an experiment designed to replicate Kihlstrom's finding that a standard amnesia suggestion would impair recall (episodic memory), but not performance on the WAT (semantic memory). To disprove his theory, he selected a group of highly hypnotizable subjects who were given Kihlstrom's standard amnesia suggestion along with the added proviso that the words will be completely gone from their memory

and that they would be unable to bring these words to mind, unable to think of them in any way (See footnote #5 for a verbatim transcription).

Spanos et al. (1982) found that subjects given the more complex suggestion demonstrated both episodic free recall deficiencies and semantic memory alterations in the form of aberrant WAT responses. Since both types of memory were disrupted, the authors interpreted their results as negating Kihlstrom's theory of hypnotic amnesia. As an alternative to Kihlstrom's contention, they claimed that subjects failed to show WAT alterations in previous studies merely because they did not view WAT performance as pertinent to their role as good hypnotic subjects. When, however, highly hypnotizable subjects were expressly told that they would not be able to use these "forgotten" words in any way, then WAT performance was seen as being pertinent, and very high hypnotizable subjects failed to give the "forgotten" words as associations to cues designed to elicit them. Thus the results were taken as support for the central role played by subjects' interpretations of the experimental context in shaping their responses to hypnotic suggestions. Accordingly, Spanos et al. (1982) concluded that hypnotic amnesia is a strategic social enactment, strongly influenced by subjects' expectations and perception of task demands conveyed by the amnesia testing situation.

It has been recognized for the last 60 years that the extent of obtained memory deficits is not only a function of subjects' level of hypnotizability and the assessment procedures used to evaluate amnesia, but that deficits also vary as a function of the explicitness

of an amnesia suggestion (Mitchell, 1932; Patten, 1932; Strickler, 1929; and Wells, 1941; see Barber, 1962, for a more extensive review). Thus, it should not be surprising that different patterns of results are obtained when the wording of a suggestion is altered, especially when the suggestion no longer strictly asks for amnesia.

While the results of Spanos et al.'s study seem consistent with the social-psychological endorsement of hypnotic amnesia, they are also open to other interpretations. One interpretation is that highly hypnotizable subjects in the Spanos et al.'s study were legitimately responding to a suggestion that required not only amnesia, but also agnosia for the target words. Such an interpretation is not without empirical precedent, since hypnotic agnosia has occasionally been observed on standardized scales of hypnotic susceptibility as an inadvertent consequence of the suggestion for nominal aphasia (Hilgard, 1965, 1977a). Forms I and II of the Stanford Profile Scales of Hypnotic Susceptibility contain suggestions for temporary, specific aphasia for the meanings of the words "house" and "scissors", respectively, so that the target word will seem like a word from a foreign language. In 40% to 50% of moderate to high hypnotizable subjects, this suggestion results in an inability to pronounce the target word, to understand the word when used by the experimenter, or to use it in the naming of objects (Kihlstrom, 1980). Occasionally this suggestion results in an agnosia in addition to the aphasia for the target words: some subjects show an inability to understand the meaning of a related word such as home -as well as house, or to demonstrate the proper use of a pair of scissors -as well as to name them (Hilgard, 1965, 1977a).

Hypnotic agnosia has also been demonstrated in more formal experimental contexts. For instance, Evans (1972) showed that a suggestion that the integer "6" would disappear from subjects' number system led to computational errors when they were subsequently confronted with arithmetic problems that contained the target digit in either the problem, the solution, or in the intermediate stages. In general, these subjects treated the digit as if it was not present or not meaningful. This pattern of performance distinguished them from simulating subjects, who tended to operate on the target digit in a logical, mathematically acceptable manner.

The present study attempted to disentangle some of the complexities involved in assessing hypnotically induced amnesia. In particular, the study attempted to highlight differences in patterns of responding to hypnotically induced amnesia and aphasia among groups of low, medium, high, and very high hypnotizable subjects and subjects simulating response to hypnosis. The suggestion employed was complex and involved the potential disruption of both episodic and semantic memory in that it called explicitly for amnesia as well as aphasia for previously memorized words and their homonyms. Once again, four possible outcomes were foreseen: Firstly, in the event that hypnotic amnesia worked exclusively by disrupting episodic memory, then very high hypnotizable subjects would show recall deficits but no inhibition of the use of homonyms of critical words on the WAT. Simulating subjects, however, would actively suppress the tendency to generate the homonyms on the WAT, leading to lower critical item frequencies but longer response latencies especially for first associate responses. Secondly, if the contentions of Spanos et al. (1982) are correct, then very high

hypnotizable and simulating subjects would show equivalent memory performance on both free recall and WAT testing. Thirdly, it was deemed possible that very high hypnotizables and simulators would inhibit homonym responses but that simulators would overplay their perceived role of good hypnotic subjects by showing relatively lower critical item frequencies and longer first associate response latencies than their highly hypnotizable counterparts. Finally, if very high hypnotizable subjects were capable of a kind of word agnosia, then they would be expected to show lower critical item frequencies without the accompanying increase in word association latencies.

In summarizing the findings of the present study, the results are generally in accordance with the third alternative in which very high hypnotizable and simulating subjects' responses to the amnesia and aphasia suggestions are similar, with simulators tending to overplay their perceived role. Upon closer examination, however, subtle but important differences were detected between very high hypnotizable and simulating subjects that are in line with the fourth alternative, namely that very high hypnotizables experienced a kind of agnosia for the memorized words and their homonyms

Low, medium, and high hypnotizable subjects, who had failed on previous occasions to display hypnotically suggested amnesia, showed no recall deficits and no associative impairments as a consequence of the amnesia and aphasia suggestions. By contrast, very high hypnotizable subjects, selected for their ability to experience posthypnotic amnesia, and unhypnotizable subjects not able to experience the phenomenon but asked to play the role of good hypnotic subjects, displayed reversible recall amnesia[10] as well as

aphasia. That is, both very high hypnotizable and role-playing subjects showed a general inhibition of the critical words and their homonyms as responses on the amnesia recall trials and WAT 1.

Although these findings, at first glance, seem to buttress Spanos et al.'s (1982) social-psychological position, very high hypnotizable and simulating subjects showed different performances on both measures of memory. Considering first the free recall responses, consistent with Williamsen et al.'s (1965) findings, simulators overplayed their perceived role of good hypnotic subjects on the first recall trial by showing virtually total amnesia. They recalled statistically fewer words than very high hypnotizable subjects. When the effect of the amnesia suggestion was reinforced following its initial assessment, very high hypnotizable subjects responded to the reinforcement of the amnesia. They recalled an average of 3 words on Test 1 and an average of 1.3 words on Test 2. This increase in degree of amnesia, however, was not significant. Simulating subjects, who were already near baseline, (recalling an average of 0.9 words on Test 1), displayed an opposite trend. They reported more (but not significantly) words after the effect of the amnesia suggestion was reinforced (recalling an average of 1.5 words on Test 2).

Very high hypnotizable subjects could also be discriminated from their simulating counterparts on the WATs. Like subjects of low, medium, and high level of hypnotizability, very high hypnotizables elicited the same amount of critical and neutral words as first associates on both administrations of the WAT. Thus, no measurable effect of the suggestions for amnesia and aphasia was found for the real hypnotizable subjects. By contrast,

unhypnotizable role-playing subjects complied to the aphasia instructions. Although they elicited the same amount of neutral words as first associates on the two WATs, they generated significantly fewer critical words as first associates on WAT 1 than on WAT 2. These findings are in line with Kihlstrom's (1980) position that amnesic subjects still have access to the critical words via semantic memory.

When the analyses were repeated excluding subjects of low, medium, and high level of hypnotic ability, this differentiation between very high hypnotizable and simulating subjects in the number of target words elicited as first associates on the WATs was lost. Again, the distinction between the two groups disappeared when intrusions were included in the analyses. Nevertheless, the combination of comparing all five hypnotizability groups versus comparing the very high hypnotizables and simulators in isolation suggests that very highs may have indeed experienced hypnotically suggested amnesia and aphasia, while simulators may have appeared amnesic and aphasic by a process of overcompliance.[11]

Very high hypnotizable subjects showed a significantly different pattern of responses than their simulating counterparts in their generation of critical materials on WAT 1. They elicited critical material, not recalled during the preceding amnesia recall test, significantly more often as first associates than as either second or third associates. For the simulators, however, such material was elicited as frequently between first, and second or third associates.

Analyses of the latencies of first associations contrasting the performance of the two main comparison groups permitted

additional discrimination between very high hypnotizable and simulating subjects. Simulators required significantly more time to generate first associations on WAT 1 than on WAT 2. Very high hypnotizables, on the other hand, elicited first associates as rapidly on WAT 1 as on WAT 2. Furthermore, low hypnotizable simulating subjects needed significantly more time to generate first associates to critical stimuli on WAT 1 than either their low hypnotizable counterparts not asked to play the role of amnesia or very high hypnotizable subjects. This differentiation was not present on WAT 2.[12] These findings support the fourth alternative that the suggestion for amnesia and aphasia seems to have induced a kind of agnosia in very high hypnotizable subjects where both episodic and semantic components of memory are impaired.

Strategies Employed by Simulating Subjects on WAT 1

The time interval between the automatic generation of a word associate and its verbal expression may involve a number of decision making processes. The performance of simulating subjects on WAT 1 suggests the use of a voluntary cognitive strategy which was not employed by "real", very high hypnotizable subjects.

Because of the nature of the word association task, where target items had relatively high probabilities of being elicited by their corresponding stimuli, it is likely that when simulators came up with a critical homonym as an association, they tended to search for an alternative response that would not violate the demands of the suggestion. For example, when presented with the stimulus "butter", a simulating subject who had learned "bred" in hypnosis, had to refrain from giving it's homonym "bread" as an associate and

had to come up with another response such as "knife". This screening process appears to explain the congruent findings that simulating subjects responded with fewer critical items as associates on WAT 1 than on WAT 2 and required more time to produce first associates on WAT 1 than on WAT 2.

The fact that very high hypnotizable subjects took significantly less time to produce first associates on WAT 1 than simulators and that they needed the same amount of time to elicit first associates on the two administrations of the WAT strongly suggests that these subjects did not engage in a voluntary cognitive strategy to meet the demands of the suggestion for aphasia. In addition, because first associates may index an automatic process, the fact that critical material was elicited significantly more often as first associates for the very high hypnotizables than for the simulators confirms the absence of the use of a voluntary strategy in very high hypnotizables' aphasic performance. Thus, it appears that at least for some target items, very high hypnotizable subjects experience a form of verbal agnosia.

Verbal Agnosia in very high hypnotizable subjects during WAT 1

The complex hypnotic suggestion employed in the present study appears, somehow, to have disrupted the automatic process by which semantic memory seems to work, including the normal spreading of activation. When a subject memorizes a list of familiar words, nodes representing features of each list item are activated in the memory network. Activation spreads from the source nodes to nodes specifying the context in which learning occurred, and to

semantically related concepts along the associative links representing relationships between features.

In a semantic memory task such as the WAT, presentation of the stimulus word leads to an automatic activation of related concepts in semantic memory. The associate item which has the highest level of activation is automatically generated. Production of the critical word as an associate is usually facilitated by virtue of the fact that it retains some activation from the prior study phase (a "priming" effect). When aphasia is suggested for the word "bred" and its homonym "bread", and the stimulus word "butter" is subsequently presented as cue, there appears to be a disruption to the automatic facilitation of the highly associated response "bread". What seems to be happening is a blocking of the associative link between these two word nodes. The suggestion seems to act by rerouting the normal associative pathways away from the critical responses. Consequently, very high hypnotizable subjects automatically elicited responses with weaker associative strength.

The fact that very high hypnotizable subjects inhibited production of critical associates without an accompanying increase in response latencies (showed by the simulating subjects) strongly suggests that, unlike simulators, very high hypnotizables did not <u>think</u> of the critical material. It is as if representation of the critical items and their associative pathways in memory were "functionally ablated" until administration of the reversibility cue. By contrast, upon presentation of a critical stimulus which serves to activate the critical homonym in semantic memory, simulators had to suppress the automatic generation of the "forbidden" word associate and select an alternative response in line with the

demands of the suggestion. It seems unlikely that very high hypnotizable subjects experience a motor aphasia where they could think of the critical words and their homonyms but did not elicit them as associates because they could not pronounce them. For real subjects, suppression/"ablation" seems more likely to have been accomplished automatically.

Contrary to the social-psychological position, the data of the present study suggest that hypnotic amnesia is not solely a voluntary strategic enactment based on subjects' interpretations of the social demands of the amnesia testing situation. The fact that genuine highly hypnotizable subjects displayed different patterns of hypnotic responses than the simulating subjects on both measures of memory argues against viewing their hypnotic behaviour as motivated primarily by the desire to appear amnesic to please the hypnotist. The results of the present study suggests that it is the simulators, as opposed to subjects of very high hypnotizability, who have a strong investment in giving a convincing hypnotic performance. Consequently, simulators respond most strongly to explicit demands and subtle cues to assist them in their hypnotic role-playing.

The present findings seem more in accordance with an internal-process account of hypnotic amnesia as being outside subjects' volitional control and carried out automatically. Subjects of very high hypnotic ability may be unable to gain access to episodic and semantic representation of target memories possibly because these have been temporarily dissociated from their conscious experience.

Neither the present results, nor those previously obtained by Spanos et al. (1982) should be taken as falsifying the findings of

previous experiments such as those obtained by Williamsen et al. (1965) and Kihlstrom (1980). The latter studies used a standard posthypnotic amnesia suggestion for a list of memorized words which did not prevent amnesic subjects from employing the list items as responses in a concurrent WAT. Thus, it may well be that when subjects are administered a standard amnesia suggestion, episodic memory is compromised while semantic memory is spared. The current study as well as the Spanos et al.'s (1982) study used more complex suggestions for hypnotic agnosia which require more complex interpretation.

Results from both the present study and the Spanos et al.'s (1982) study suggest that the cognitive mechanisms underlying such suggestions may be different from those underlying more simple suggestions. These complex hypnotic suggestions for a combination of memory deficits lead to both recall and associative impairments suggesting that semantic as well as episodic aspects of memory processing are disrupted. Just as research on posthypnotic amnesia has made effective use of methodologies developed for the study of episodic memory, so too research on hypnotic aphasia and agnosia may profitably draw on paradigms developed in the clinical study of these phenomena and the laboratory study of semantic memory.

The present results need to be replicated. If the different performance of highly hypnotizable subjects is due to automaticity, it might be fruitful to capitalize on this phenomenon in future inquiries. The use of a task where simulating subjects are forced to employ cognitive strategies should yield a different performance than the more effortless one of genuine highly hypnotizable subjects. In hypnosis, instructions and suggestions administered to

subjects are confounded, especially in highly hypnotizables. Consequently, it is always possible, by modifying the wording of instructions, to equate the overt behaviourial performance of real and role-playing hypnotic subjects. We would have to devise a way of measuring hypnotic behaviour that is not confounded with external demands. This is not an easy task.

Spanos' assumption that there is nothing "special" about the hypnotic performance of highly hypnotizable subjects because similar behaviour can be obtained from unhypnotized simulating or task-motivated subjects is faulty. Spanos' logic of equivalence is misleading because it is not necessarily telling us what is happening cognitively in highly hypnotizable subjects. The fact that highly responsive hypnotic subjects display similar behaviour to unhypnotized subjects does not mean that their cognitive functioning and subjective experiences are equivalent. While the hypnotic behaviour of highly hypnotizable subjects seems to be automatic (nonvolitional) and effortless, role-playing and task-motivated subjects may be using volitional cognitive strategies to display equivalent behaviour.

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Footnotes

1. This is a broad grouping which does not postulate mutually exclusive categories. For example, Sarbin and Coe's (1972) formulation of hypnosis as "believed-in" imaginings has some clear affinities with several inner-process positions. Notwithstanding, these investigators identify themselves as social-psychological in primary orientation.
2. Hilgard's (1974; 1977a; 1977b; 1979) neo-dissociation model is just one of a number of internal-process views.
3. Source amnesia occurs when amnesic subjects maintain access to factual information acquired during hypnosis, but cannot reconstruct the (hypnotic) source of that information. Instead, they may confabulate, attributing the memory to some other plausible context.
4. Trance logic refers to a lack of critical judgment and greater tolerance for logical incongruity on the part of the hypnotized person (Orne, 1959).
5. Spanos et al. (1982) added the following to the standard amnesia suggestion to imply that it was intended to cover memory tasks in addition to list recall:

> Until [you receive the cancellation cue] the words will be completely gone from your memory, and you will be unable to recall them or think of them in any way. No matter what else you are asked to do, you will be unable to bring these words to mind, unable to think of or remember them in any way,

until I say "Now you can remember everything" (p. 568).

6. The symbol "-" represents failure to respond to suggested amnesia on the SHSS: C screening session, and the symbol "+" represents a pass on the same item.
7. English was not the mother tongue of two low, two medium and three high hypnotizable subjects (e.g., Italian, Portuguese, and Chinese) but these subjects were all educated in English. One very high hypnotizable subject's language of early education was French but her mother tongue was English.
8. Note that the present study's suggestions for posthypnotic amnesia and aphasia incorporated the two phrases added by Spanos et al. (1982) to the standard suggestion to convey to subjects that the amnesia was intended to cover memory tasks in addition to list recall (i.e., that memory would be impaired in testing contexts other than list recall).
9. The two genuine subjects simply remembered the words. One subject reported not being hypnotized. "The words came back and I couldn't shake them". The other subject reported that, when given the amnesia suggestion, he remembered the words and he tried to forget them. "There was a constant battle between trying to remember and trying to forget".

   The two simulating subjects showed amnesia on Test 1 but did not understand that the amnesia should be maintained. Both subjects thought the amnesia had been lifted, did not know when they were not suppose to remember the homonyms, and realized they had erred when the experimenter cancelled the suggestion.

The analyses on the WAT were performed including the simulator outliers and the same pattern of results emerged as when they were excluded. Since very high hypnotizable outliers were eliminated from these analyses, it was decided to eliminate simulator outliers as well.

10. Very high hypnotizable and simulating subjects maintained their amnesia until the administration of the reversibility cue. Thus, production of critical items as word associates on WAT 1, when it occurred, did not "appear" to remind the amnesic subjects of the "forgotten" words. In effect, WAT 1 was ineffective in breaching their amnesia. This finding is not novel. It replicates and confirms results of previous experiments when either a standard or an alternate amnesia suggestion was employed (Williamsen et al., 1965; Kihlstrom, 1980; Spanos et al. 1982).
11. In contrast to earlier experiments that employed a standard amnesia suggestion, very high hypnotizable and simulating subjects failed to show a "priming" effect of residual learning on WAT 1 (i.e., critical items from the memorized word list were not elicited as associates more frequently than appropriately matched neutral items, that had not been previously learned). Note that very high hypnotizable and simulating subjects showed a "priming" effect for critical items on WAT 2 when the intrusions were considered in the analyses (Refer to upper panel of Figure 3). The presence of a "priming" effect on WAT 2 was highlighted when all three associations were analyzed (Refer to bottom panel of Figure 3). These findings are consistent with those of Spanos et al. (1982) where very high hypnotizable subjects who received the

alternate amnesia suggestion failed to show a "priming" effect on WAT 1 but showed this effect on WAT 2.

It is not clear why in the present study, low, medium, and high hypnotizable subjects failed to consistently show a "priming" effect on both WATs since these subjects showed this effect in both the Williamsen et al.'s (1965) and Kihlstrom's (1980) studies. Spanos et al. (1982) also found that medium and high hypnotizable subjects demonstrated a "priming" effect on WAT 1 and WAT 2 irrespective of the suggestion administered. A possible explanation for the absence of a "priming" effect in less responsive hypnotic subjects resides in the choice of the stimulus-response pairs selected in this study. Because of the homonym restriction, the average stimulus-response probabilities were somewhat lower in the present study (List 1 $\underline{M}$ = .35 and List 2 $\underline{M}$ = .37) than in Kihlstrom's (1980) and Spanos et al.'s (1982) experiments (List 1 $\underline{M}$ = .52 and List 2 $\underline{M}$ = .51). The average stimulus-response probabilities in the Williamsen et al.'s study were above .70. This may explain why these investigators, but not Kihlstrom (1980) or Spanos et al. (1982), found a "priming" effect for latency in addition to frequency. Thus, the stimuli used during the WATs may not have been as effective in eliciting their intended target words as in previous studies. If this was the case, one has to address the presence of a "priming" effect on WAT 2 in very high hypnotizable and simulating subjects. It could be argued that the performance of these subjects on WAT 1 reflects a holding back effect. That is, very high hypnotizables and simulators purposely inhibited their production of critical items as associate responses during

suggested amnesia and aphasia. On WAT 2, after the suggestion was cancelled, these subjects made a point of reporting critical items. This possibility would strongly support Spanos et al.'s (1982) position. However, the fact that low, medium, and high hypnotizable subjects did not show a "priming" effect on WAT 1 may suggest that it is not a holding back effect since these subjects were not amnesic.

12. Very high hypnotizable and simulating subjects did not differ significantly in terms of the latencies required to elicit critical items, either as first or as continued associates, on both WATs. This finding is consistent with those of Kihlstrom (1980) and Spanos et al. (1982) for the standard amnesia suggestion who reported no differences between the two WATs in subjects' (including amnesics) RLs for critical words. This finding, however, is inconsistent with the results of Spanos et al. (1982) for the alternate suggestion condition where it was found that very high hypnotizable subjects' RLs for critical words were significantly longer on WAT 1 than on WAT 2. The authors interpreted this finding as reflecting subjects' uncertainty of the appropriateness of reporting critical words as associates on WAT 1. However, no effect of hypnotizability was found for their analyses of RLs. That is, medium, high, and very high hypnotizable subjects who received the more complex suggestion in the Spanos et al. 's (1982) study required significantly more time to generate critical associates on WAT 1 than on WAT 2. While medium and high hypnotizable subjects displayed the same RL patterns as very high hypnotizables, it seems erroneous to interpret their RL

performance as reflecting their concern of the appropriateness of reporting critical words on WAT 1 since medium and high hypnotizable subjects in Spanos et al. (1982) alternate suggestion condition showed a priming effect by reporting significantly more critical than neutral words as associates on both WATs.

Appendix A

Reproduction of Williamsen, Johnson, and Eriksen's (1965) Results

Williamsen, Johnson, and Eriksen's (1965) Results on the Recall Tests

Mean Number of Words Recalled by Groups on First and Second Recall Tests

Test	Groups					
	High susceptibility			Low susceptibility		
	Hypnotized	Simulator	Control	Hypnotized	Simulator	Control
Recall 1	1.3	0.0	5.4	3.8	0 0	5.5
Recall 2	4 6	5.5	5.4	4.8	4.2	5.6

Note Mean differences of 1 0 and 1 1 are significant at approximately the 0 1 level for within- and between-group comparisons

Note. From "Some Characteristics of Posthypnotic Amnesia by J. A. Williamsen, H. J. Johnson, and C. W. Eriksen, 1965, Journal of Abnormal Psychology, 70, p. 125.

Williamsen, Johnson, and Eriksen's (1965)
Results on The Partial Word Test

Mean Number of Partial Word Solutions and Mean Latency in Seconds per Solution by Groups for Experimental and Control Words

	Groups					
	High susceptibility			Low susceptibility		
	Hypnotized	Simulator	Control	Hypnotized	Simulator	Control
Mean solutions						
Exp. words	3.5	1 6	4.6	3.4	1 7	3 9
Con. words	0 9	1.9	1.0	1 3	1 2	1 2
Mean Latency						
Exp. words	15.7	24.5	10 5	15 7	24 4	15 9
Con words	23 4	22 7	23 8	23 7	23 5	22 4

Note For the number of solutions mean differences of 1 5 and 1 7 are significant at approximately the 01 level for within- and between-group comparisons, respectively The corresponding mean differences for the latency data are 1 5 and 6 3

Note. From "Some Characteristics of Posthypnotic Amnesia by J. A. Williamsen, H. J. Johnson, and C. W. Eriksen, 1965, Journal of Abnormal Psychology, 70, p. 126.

Results on the Word Association Tests

Mean Number of Experimental and Control Words Given as Associations and Mean Latency in Seconds of Associations by Groups on the Two Administrations of the Word Association Test

	Groups					
	High susceptibility			Low susceptibility		
	Hypnotized	Similator	Control	Hypnotized	Simulator	Control
WAT 1						
Words						
Exp words	4.8	1.7	4.6	4.5	4.6	4.0
Con words	3.5	3 6	3.7	3.2	3.7	4.0
Latency						
Exp words	1 2	2.3	1.2	1.3	1.8	1.0
Con. words	1 1	1.7	1.2	1.3	1.7	1.1
WAT 2						
Words						
Exp words	0 7	0.4	0.5	0.3	0.9	0.7
Con. words	1.0	1.1	0.3	0.7	0.6	0.9
Latency						
Exp words	2 3	2.9	3.1	2.3	2.8	2.1
Con words	2.0	2.3	2.4	2.5	2.6	2.2

Note. From "Some Characteristics of Posthypnotic Amnesia by J. A. Williamsen, H. J. Johnson, and C. W. Eriksen, 1965, Journal of Abnormal Psychology, 70, p. 127.

Williamsen, Johnson, and Eriksen's (1965) Results on the Word Recognition Test

Mean Number of Words Recognized and Mean Time in Seconds Spent on Recognition Task by Groups

	Groups					
	High susceptibility			Low susceptibility		
	Hypnotized	Simulator	Control	Hypnotized	Simulator	Control
Words recognized	2.9	0.1	5.5	5.1	0.0	5.5
Time on task	51.9	27.6	46.0	41.4	33.9	44.3

Note. Mean differences of .43 on words recognized and of 11.7 on time scores are significant at approximately the .01 level

Note. From "Some Characteristics of Posthypnotic Amnesia by J. A. Williamsen, H. J. Johnson, and C. W. Eriksen, 1965, Journal of Abnormal Psychology, 70, p. 126.

Appendix B

Advertisement in University Newspapers for Subject Recruitment

Advertisement in "The Link"
Concordia University Student Newspaper

The Hypnosis Laboratory of Concordia University is looking for participants for studies involving memory, imagery, and hypnosis. Those interested should contact the Laboratory Monday 4:00-6:00 pm or Tuesday 1:00-3:30 pm at 848-2213. Volunteers will be paid for their participation.

Appendix C

Consent Form for the HGSHS:A

HGSHS:A INFORMED CONSENT

Background Information for Participation in
Research Studies in the Hypnosis Laboratory
Department of Psychology
Concordia University

Name: _____

Telephone: (Home) _____ (Work) _____

The research carried out with volunteer subjects in the Hypnosis Laboratory of the Department of Psychology includes a number of continuing research projects. Our studies are concerned with understanding more about the nature of hypnosis and various hypnotic phenomena. The success of our research depends upon the assistance of volunteers like yourself, and we are very grateful for your participation.

Please sign this form after reading the following section:

Today I am volunteering to participate in a research study which involves the group administration of a combination of hypnotic test items (e.g., hand lowering which will be tested by holding my arm out and seeing if it moves downward; arm rigidity, where I will be asked to imagine that I cannot bend my outstretched arm; finger lock, where I will be asked to imagine that I cannot unclasp my hands from one another). My participation will also involve answering a questionnaire concerning my experience of hypnosis. I also understand that I may be asked to participate in future sessions involving research in memory, imagery, and hypnosis.

Signature: _____

Investigator: _____

Date: _____

Appendix D

Consent Form for the SHSS:C

SHSS:C INFORMED CONSENT

Background Information for Participation in
Research Studies in the Hypnosis Laboratory
Department of Psychology
Concordia University

Name: _____
Telephone: (Home) _____ (Work) _____

The research carried out with volunteer subjects in the Hypnosis Laboratory of the Department of Psychology includes a number of continuing research projects. Our studies are concerned with understanding more about the nature of hypnosis and various hypnotic phenomena. The success of our research depends upon the assistance of volunteers like yourself, and we are very grateful for your participation.

Please sign this form after reading the following section:

Today I am volunteering to participate in a research study which involves the individual administration of a combination of hypnotic test items (e.g., hand lowering which will be tested by holding my arm out and seeing if it moves downward; a hypnotic dream in which I will be asked to dream about hypnosis; hypnotic age regression where I will be asked to relive a past experience; etc). The session will be videotaped so that hypnotic susceptibility can be objectively measured, but the videotape will remain confidential. My participation will also involve discussing my experience of hypnosis. Following the session I will be paid $7.00 for my participation. Additionally, I affirm by my signature that I am not presently using on a scheduled basis any medication prescribed by a doctor for the control of mood, anxiety, or difficulty in focusing.

Signature: _____
Investigator: _____
Date: _____

Appendix E

Consent Form for the Experimental Session

HYPNOSIS AND MEMORY STUDY: INFORMED CONSENT

Background Information for Participation in
Research Studies in the Hypnosis Laboratory
Department of Psychology
Concordia University

Name: _____
Telephone: (Home) _____ (Work) _____

The research carried out with volunteer subjects in the Hypnosis Laboratory of the Department of Psychology includes a number of continuing research projects. Our studies are concerned with understanding more about the nature of hypnosis and various hypnotic phenomena. The success of our research depends upon the assistance of volunteers like yourself, and we are very grateful for your participation.

Please sign this form after reading the following section:

Today I am volunteering to participate in a research study investigating hypnosis and memory. The study involves learning a list of familiar words while hypnotized followed by the administration of memory tasks posthypnosis. My participation will also involve discussing my experience of hypnosis. Parts of the session will be videotaped and/or audiotaped as it is the standard practice in the Hypnosis Laboratory, but the tapes will remain confidential. Following the session I will receive payment of $7.00 for my participation.

Signature: _____
Investigator: Marie Claude Lamarche
Date: _____

Appendix F

Simulating Instructions

Simulating Instructions

Following Orne's (1979, Pp.533-534) Simulating Procedure

We appreciate your participation in our sessions in the past. Today I would like you to take part in a very interesting experiment that is quite different from any in which you have participated to date... You have attempted to go into hypnosis several times and found it quite difficult to respond. Though I understand you may have been able to experience certain items, it was not possible to experience much else... In this particular study there is a special group of subjects to which you will belong, all of whom did not experience hypnosis despite their honest efforts to do so. As you know, people vary in their ability to respond; some individuals find it very easy while some individuals find it more difficult. This doesn't seem to be related to any other personality characteristics. In this instance your task will be to simulate being a good hypnotic subject. You will be working with Marie Claude who is a very experienced and competent hypnotist and will be carrying out an important piece of research. Your task will be to behave as though you were one of those good hypnotic subjects. There will be several kinds of subjects in this experiment ranging from those who are good hypnotic subjects to those who find it difficult to experience hypnosis. Further, there will be several individuals like yourself who will be simulating being a good hypnotic subject.

Marie Claude does know that some subjects will be simulating but has no idea who these subjects will be. Your task is to convince her that you are in fact a good hypnotic subject. Now this is a difficult task and you may well do something where you think you

have given yourself away. Don't worry about this possibility, because if Marie Claude recognizes the fact that you are simulating she will stop the experiment immediately. Therefore, as long as she continues with you, you know you have been successful in simulating hypnosis. I point this out to you because in the past we have found some subjects would suddenly stop, thinking they had goofed and given themselves away, when, in fact, their behaviour had been quite appropriate and the investigator had no idea that they were simulating. Keep in mind, then, that as long as the experimenter continues with you, you are doing all right; if she catches on she will stop the session immediately.

We realize that you have no experience in how to do this. However, we also know from previous studies -we have run a great many studies using this procedure- that subjects are able to do this. It is difficult but it is possible... I can't tell you how to behave or what to do. Listen to the instructions that Marie Claude will give you and base your performance on your best judgment. You have to use whatever you know about hypnosis, whatever cues you get from Marie Claude, and whatever you learn from the situation to figure out how a hypnotized subject would behave, and your task is then to use this information in your simulation of hypnosis. Keep in mind that you will be simulating the behaviour of a good, highly hypnotizable individual and that your task is to maintain that you are going into hypnosis, to perform during hypnosis, and, when you are awakened, to respond as if you had been in hypnosis. In other words, this includes simulating not only while you are being hypnotized but afterwards as well. When Marie Claude asks you about your experiences you should answer the way a good hypnotic

subject would answer if he or she had actually been in hypnosis. If Marie Claude asks you how you did the last time, keep in mind that you are a good hypnotic subject and you would have gone into hypnosis on your previous efforts. You would have had several previous experiences with hypnosis just as you actually have, except that you would have been a good hypnotic subject.

At no time, once I leave this room, may you reveal to anyone that you are simulating. They will not know that you are simulating. Though it is known that some subjects will be simulating, no one knows who they are except for me. When you are completely finished with the experiment, Marie Claude will leave the room and I will return to discuss your experiences with you. Until you are back with me at the very end of the experiment, you are to reveal to no one that you are not actually hypnotized: this means the experimenter or anyone else who asks you about your experiences other than me when I return in this room.

(*IF SIMULATING SUBJECT ASKS SOMETHING ABOUT HOW TO PERFORM:* I really can't tell you how to simulate or what to do. I can only tell you to do what you think you should do. It is a difficult task but we have found that subjects have been able to do it successfully.)

Appendix G

Hypnotic Induction and Deepening Items

Standard Hypnotic Induction Procedure from the SHSS:C

First of all, just get yourself comfortable in the chair... just move around until you find a comfortable position... notice that the back of the chair is adjustable... just get comfortable and relaxed...

Unclasp your hands and let them just rest loosely on your lap, or the arm of the chair... and uncross your legs and let them find a comfortable position (on the footrest of the chair)... and if at any time during the session you find that this position is uncomfortable you can simply adjust it to a more comfortable one without in any way disturbing the hypnosis...

... I'd like you to look at the dot on the door... and focus your vision on it. I will refer to the dot as the target. In the meantime, I'm going to give you some simple instructions that will help you to experience hypnosis. You will find the instructions easy to follow and that you will be able to experience the things I describe to you.

Indeed you will probably find that you will be able to experience these things with great vividness... with great intensity...

As you stare at the target, you may find that occasionally your gaze may wander or that your vision may even blur... If this happens, simply refocus your vision and continue staring evenly at the target...

Now take a deep breath in and hold it... then... just let it out very slowly... You find that you start to experience a comfortable feeling... a feeling of well being begins to develop as you continue to rest in the chair... looking at the target... listening to my voice...

Focus your attention closely on feelings of warmth and relaxation in various parts of your body... in your head and in your neck... in your arms and in your legs... in your chest and in your back... and just breathe freely and evenly and deeply... freely... evenly... and deeply... not too quickly... not too slowly... just at a comfortable rate for you to notice that the relaxation increases gradually... as you breathe out... and just rest there for a moment experiencing the sensations... Continue relaxing your chest so that feelings of warmth and comfort irradiate to your back... your shoulders... and your neck... and your arms... and your legs...

You're probably starting to notice some changes in the target... changes that occur from staring at it for so long... sometimes the target may look as though it's moving up and down or from left to right... at times it may appear very distinct and clear.... at other times it may appear fuzzy and blurred... and it may change colour... You may see one of these things or even all of these things... whatever you see just continue staring at the target... continue listening to my voice... continue to become more deeply relaxed... more deeply relaxed...

And as you watch the target your eyelids become heavier... your eyes become tired from staring... your eyelids start to feel very tired and heavy... as you sit there breathing freely and evenly... and deeply... breathing in... breathing out... freely and evenly and deeply... Your eyelids are becoming so heavy... so tired... that soon they will just close of their own accord... as if they were coated with lead paste... as if there were magnetic fields in the eyelashes.... drawing your eyelashes together... Concentrate now.. even more carefully... on feelings of relaxation and comfort in various parts of your body...

First of all think of relaxation in the muscles of your left leg... the left foot... the toes of your left foot... the left calf... the left thigh... And then relax the muscles of the right leg... the right foot... the toes of your right foot... the right calf... the right thigh...

Think of relaxation in each of these areas... and as you think of relaxation, the muscles become progressively more relaxed... And then relax the muscles of your back... your chest... your neck... relax each of these muscle groups... the back... the chest... and the neck...

And then relax the muscles of your left arm... the left hand... the fingers of the left hand... the left forearm... the left upperarm... the left shoulder... And then relax the muscles of the right arm... the right hand... the fingers of the right hand... the right forearm... the right upperarm... the right shoulder.

And as you relax these muscles... your facial muscles will also relax and loosen of their own accord...

Just thinking about relaxation in each of these area causes the muscles to become more relaxed... and you may even find an interesting thing happens... that the feelings of relaxation you feel in each of these areas of the body start to spread and irradiate... so that they may seem to join up... like the parts of a jigsaw puzzle... and you feel a deep feeling of overall relaxation... of contentment... and of well being... permeating the whole of your body...

(IF EYES NOT CLOSED)

And you have concentrated well on the target and your eyes have become tired and strained from staring... There is no longer any need to strain them anymore... They would soon close of their own accord... but you can just close your eyes now... Just close your eyes... That's it...

With your eyes closed... you're ready to experience hypnosis... to experience it more profoundly... but you'll find that no matter how deeply relaxed you ever feel... no matter how deeply in hypnosis you ever feel... your mind is always clear... you're always aware of my voice and what I'm saying to you... you're always aware of what is happening to you... even though you are deeply relaxed... deeply in hypnosis...

And you will be able to speak to me when I speak to you... to open your eyes... and to move around while remaining deeply hypnotized... whatever you experience or do... you will remain deeply hypnotized... deeply in hypnosis...

You can now go even deeper in hypnosis... Say to yourself, just by thinking it, "Now I'm going deeper and deeper". Think it to yourself... (PAUSE)... And imagine yourself standing at the top of an escalator... Visualize the scene of the escalator... of the steps moving down... and picture the moving hand rail...

In a moment I'm going to ask you to count to yourself, slowly from 1 to 10, imagining as you count, that you are stepping onto the first step of the escalator and standing with your hand on the railing while the steps move down... carrying you deeper and deeper... into hypnosis. You can plan it so that you reach 10 just as you reach the bottom and step off the escalator; and to indicate to me that you have reached 10, the index finger of your right hand will lift up slowly... And I'll know that you have reached 10... More and more deeply relaxed as you start counting to yourself... from 1 to 10...

(WHEN FINGER HAS LIFTED)

You can just relax your finger now... deeply relaxed... deeply hypnotized...

Deepening Items

Awareness of the Right Hand

(IF SUBJECT'S RIGHT HAND IS NOT ON HER/HIS LAP, ASK SUBJECT TO PUT HER/HIS HANDS ON HER/HIS LAP)

I'll like you to pay attention now to you right hand and you will notice some very interesting things as you pay close attention to it. You will notice that you can feel the fabric of your clothes through the fingertips of your right hand, and you may notice the quality of the fabric, the coarseness of it, on your fingertips.

And, it's even more interesting to notice, as you focus your attention on your right hand and fingers, that you can feel the heat coming from your body through your clothes to your fingertips, you can sense the heat in your fingertips and that's kind of interesting because you didn't notice that before. And now you may notice that there is an increased sense of warmth in your right hand as the circulation improves. You may notice a tingling sensation in one or more fingers of your right hand; and you may notice that one or more fingers of your right hand may begin to twitch slightly. Your fingers may twitch slightly and that's fine.

You may notice that the fingers of your right hand may begin feeling more and more weightless and light, and then your hand... your fingers and your hand... and your arm will feel lighter and lighter, and more and more weightless.

Arm Levitation

(SUBJECT MAY RESPOND QUICKLY. ADJUST THE SCRIPT IF NECESSARY)

From your fingertips, up your arm, all the way to your shoulder... it begins to feel lighter... and more and more weightless. It will be as if your hand and your arm are like a large balloon of your favourite colour, filled with helium gas, which is lighter than air, allowing the balloon to float upward toward the blue sky, and the warm summer sun, and the white fleecy clouds.

And the balloon begins to feel lighter and lighter. You may notice then that one or more of the fingers of your right hand will begin gently lifting upward, slowly at first and then faster and faster, as they feel lighter, and lighter... They're beginning to float upward more and more, with each breath that you take as they feel lighter and lighter... floating, gently floating and drifting up. That's fine, more and more weightless, more and more weightless, as it begins drifting upward, higher and higher *(PAUSE 10 SECONDS)*

(IF SUBJECT HAS RESPONDED & ARM HAS LIFTED)

And now the normal sensations are returning to your arm... the normal heaviness has returned to your arm... and you can just let it return, back down to your lap. That's fine. *(GO TO ARM RIGIDITY)*

(REINFORCE SUGGESTION IF SUBJECT HAS NOT RESPONDED & ARM IS NOT UP)

That's a very interesting experience you've had and perhaps you can feel some lightness in your arm as your subconscious activates the autonomic nervous system, the proper muscles, and ligaments, and tendons, that will raise your hand and your arm without conscious effort required on your part, and it's a very interesting experience. It's very interesting and quite normal and it's getting lighter and lighter and drifting higher and higher as it feels lighter and lighter. And faster, moving up a little more quickly, faster and faster as it feels lighter and lighter.

(IF SUBJECT HAS RESPONDED)

That's fine, and now it can drift there all day long. It could drift there all day long if it wanted to and you wouldn't feel any tiredness at all in that hand and arm. It would drift there like that lazy, light, weightless balloon in that blue summer sky, feeling very very comfortable.

That's fine. And now all the normal sensations are returning to your arm... the normal heaviness is returning to your arm... and you can just let your arm relax (OR- return back to your lap now).

Arm Rigidity

Now, I'd like you to extend your right arm straight out in front of you at shoulder height... And I want you to make a fist with your right hand. Your right arm from your shoulder all the way down to your hand will stiffen up and get very stiff and rigid. Your elbow will lock and your arm will feel like a rigid, tough, steel bar. Rigid, tough and unbending, and that will be fine. That will be an interesting experience also. That arm will be so steely and rigid and tough and unbending... it will not bend, and that is perfectly fine. Now, try hard to bend it... try very hard.

(PAUSE 10 SECONDS)

That's fine. I'm going to count to three, and when I reach three, I'd like you to very slowly begin lowering that steel bar arm about three degrees at a time, a few degrees at a time, back to your leg... where it will again feel perfectly normal in every way. 1-2-3... *(PAUSE) (WHEN ARM REACHES LEG)*: Your arm and hand feel normal again. They no longer feel tired or heavy or stiff. Your arm and hand are back in position feeling comfortable and relaxed and not at all tense or strained. You feel deeply relaxed and comfortable, deeply relaxed in hypnosis, feeling very secure and comfortable and at ease, and this is a very pleasant feeling.

Appendix H

Suggestions for Posthypnotic Amnesia and Aphasia

Posthypnotic Amnesia and Aphasia Suggestions

Remain deeply relaxed and pay close attention to what I am going to tell you next. Later on I will count backwards from 10 to 1... and at 1, not sooner, you will open your eyes and no longer be hypnotized...

When you awaken... you probably will have the impression that you have slept because you will have difficulty in remembering the things you did while you were hypnotized. In particular you will not be able to remember that you learned any words while you were hypnotized. You will continue to be amnesic for all of the words you learned. Not only will you continue to forget all of the words but you will also be amnesic to any words that sound the same as the ones you learned. You will be unable to say the homonyms of the words (i.e., words that sound the same but have a different meaning such as sail -as in sailboat, and sale -as in garage sale). For example, if you had learned the word tale, you would be unable to say the word tale as in story and you would also be unable to say the word tale as in the tail of an animal. The words, including what they sound like, will be completely erased from your memory. You will be unable to see the words, hear the words, pronounce the words, or their homonyms until I say to you "Now you can remember everything". Until that point the words and their homonyms will be completely gone from your memory, and you will be unable to recall them or think of them in any way. No matter what else you are asked to do, you will be unable to bring these words to mind, unable to think of or remember them in any way, until I say "Now you can remember everything". Then you will be able to remember

everything, including the fact that you learned some words and what they were. But you will not be able to remember these things until I say to you "Now you can remember everything"...

Appendix I

Postexperimental Inquiry

Response to Posthypnotic Amnesia and Aphasia in
Highly Hypnotizable and Simulating Subjects

Subject #: _____
Condition: _____

Scoring sheet

POSTEXPERIMENTAL INQUIRY

(TURN ON AUDIOTAPE)

I'll ask you some questions about the study.

To Simulating Subjects: You don't have to maintain your role of good hypnotic subject anymore. You can tell me exactly what was really going on inside your head during the experiment.

To All Subjects: Were there any words that you were not familiar with or did not understand? _____

To All Subjects:

1. How did you find this experiment?

2. What did you think the experiment was about?

3. What do you feel the experiment is trying to demonstrate?

4. What do you think is the hypothesis of the experiment?

5. How do you think you performed in the experiment?

6. How do you think others performed in the experiment?

To All Subjects:

-The questions that I will ask you next concern your experience **during hypnosis**. While you were in hypnosis you memorized a list of words and you were subsequently given a suggestion to forget these words.

7. When you were asked in hypnosis to recall the words you had learned did you remember any of them?

(IF SUBJECT ANSWERS NO, GO TO 8)
(IF SUBJECT ANSWERS YES, GO TO 9)

8. What was your experience like during that period?

---

9. Did you report any of them?

Why?

To All Subjects:

-The next set of questions concerns your experience **after hypnosis but before the amnesia suggestion was cancelled** by Marie Claude saying "Now you can remember everything"?

10. After hypnosis you were asked a second time to recall the words you had learned during hypnosis. Did you remember any of them?

(IF SUBJECT ANSWERS NO, GO TO 11)
(IF SUBJECT ANSWERS YES, GO TO 12)

11. What was your experience like during that period?

---

12. Did you report any of them?

Why?

To All Subject:

(GIVE LIST OF WORDS TO SUBJECT)

This is the list of words you were asked to give associations to the first time (that is **before the amnesia was cancelled**).

Indicate the words that were most difficult finding associations to by placing a ***D*** beside them.

(WAIT FOR COMPLETION)

Now, indicate the words that were most easy finding associations to by placing an ***E*** beside them.

(WAIT FOR COMPLETION)

(REFER TO LIST OF TARGET STIMULI ATTACHED AT THE END)

(TRY TO SELECT 2 TARGET CUES & 1 NON-TARGET CUE MARKED D AND ASK ...)

13. Why was it difficult to associate to eg. 1: _____ ?

---

14. Why was it difficult to associate to eg. 2: _____ ?

---

15. Why was it difficult to associate to eg. 3: _____ ?

(TRY TO SELECT 2 TARGET CUES &
1 NON-TARGET CUE MARKED E AND ASK ...)

16. Why was it easy to associate to eg. 1: _____ ?

---

17. Why was it easy to associate to eg. 2: _____ ?

---

18. Why was it easy to associate to eg. 3: _____ ?

-When you were asked to produce three associations to the series of words the first time (that is **before the amnesia was cancelled**)

19. Did the words you learned during hypnosis come back to mind?

---

20. Did you use some of these words as associations?

(IF SUBJECT ANSWERS NO TO 20 BUT DID IN FACT USE SOME OF THE WORDS LEARNED DURING HYPNOSIS AS ASSOCIATIONS, GIVE AN EXAMPLE)

(IF SUBJECT ANSWERS NO TO 19 AND YES TO 20, GO TO 21)
(IF SUBJECT ANSWERS YES TO 19 AND YES TO 20, GO TO 21 BUT SAY: "Were you aware that even though you were suppose to be amnesic...)

(IF SUBJECT ANSWERS YES TO 19 AND NO TO 20, GO TO 26)
(IF SUBJECT ANSWERS NO TO 19 AND NO TO 20, GO TO 29)

21. Were you aware that even though you were (supposed to be) amnesic to the words you learned during hypnosis, you reported some of them as associations?

---

22. What was it like?

---

23. Why did you use some of the words you learned during hypnosis as associations when you were supposed to be amnesic?

---

24. Following the task where you were required to give associations you were asked to recall again the words that you had learned during hypnosis. Did producing some of the words you had learned during hypnosis as associations help you with the subsequent recall task?

(IF SUBJECT ANSWERS NO, GO TO 25)
(IF SUBJECT ANSWERS YES, GO TO 26)

25. How come?

(GO TO 29)

26. Did you think of some of these words when asked to give associations?

---

27. Did you have an urge to report some of them as associations?

(IF SUBJECT ANSWERS YES TO EITHER 26 OR 27, GO TO 28)
(IF SUBJECT DID NOT ANSWER YES TO EITHER 26 OR 27, GO TO 29)

28. Why did you not use them as associations?

-These two last questions concern your experience **after the amnesia suggestion was cancelled** by Marie Claude saying "Now you can remember everything".

29. What happened when you were asked to recall the list of words that you had learned during hypnosis?

(FOR SUBJECTS WHO REPORTED A MEMORY IMPROVEMENT, GO TO 30)
(FOR SUBJECTS WHO REPORTED NO MEMORY IMPROVEMENT, GO TO 31)

30. What was your experience like during that period?

---

31. What happened when you were asked to give associations to the series of words the second time (that is, after the cancellation of the amnesia suggestion)?

(FOR SUBJECTS WHO REPORTED THAT IT WAS EASIER THAN BEFORE, GO TO 32)
(FOR SUBJECTS WHO REPORTED THAT IT WAS NOT EASIER THAN BEFORE, GO TO 33)

32. Why was it easier?

---

33. Do you have any comments that may help to clarify things not apparent in the experimental session?

(DEBRIEF SUBJECT ABOUT NATURE AND PURPOSES OF THE EXPERIMENT)

We appreciate your participation in this experiment.

(PAY SUBJECT $7 AND FILL OUT RECEIPT FORM)

Appendix J

Individual Scores for Each Subject on all Variables

Individual Scores for Each Subject on all Variables[a]

Performance on the Free Recall Tests

Total Number of Correct Words Recalled

	Recall 1	Recall 2	Recall 3	Recall 4
Low				
Subject # 1	7	7	7	7
Subject # 2	7	7	7	7
Subject # 3	6	6	6	6
Subject # 4	7	7	6	7
Subject # 5	7	7	7	7
Subject # 6	7	7	7	7
Subject # 7	7	7	7	7
Subject # 8	6	6	6	6
Subject # 9	7	5	5	5
Subject # 10	7	7	7	7
Medium				
Subject # 1	1	1	2	7
Subject # 2	3	7	7	7
Subject # 3	7	7	7	7
Subject # 4	2	5	4	7
Subject # 5	7	7	7	7
Subject # 6	5	7	7	7
Subject # 7	5	6	6	7
Subject # 8	7	7	7	7
Subject # 9	7	7	7	7
Subject # 10	7	7	6	7

	Recall 1	Recall 2	Recall 3	Recall 4
High				
Subject # 1	4	4	6	6
Subject # 2	4	3	3	3
Subject # 3	6	7	7	7
Subject # 4	6	4	4	6
Subject # 5	4	3	3	7
Subject # 6	1	0	0	7
Subject # 7	7	7	7	6
Subject # 8	7	7	7	7
Subject # 9	7	7	7	7
Subject # 10	7	7	7	7
Very high				
Subject # 1[b]	3	6	6	6
Subject # 2	5	0	3	7
Subject # 3	0	0	0	6
Subject # 4	7	0	2	7
Subject # 5	0	0	0	7
Subject # 6	1	0	1	5
Subject # 7[b]	7	7	7	7
Subject # 8	0	0	0	7
Subject # 9	7	0	0	7
Subject # 10	0	0	1	6
Simulator				
Subject # 1[b]	2	7	7	7
Subject # 2	7	0	0	6
Subject # 3	0	0	6	7
Subject # 4	0	0	0	6
Subject # 5	0	0	0	6
Subject # 6[b]	0	7	7	6
Subject # 7	0	0	2	7
Subject # 8	0	0	0	7
Subject # 9	0	0	1	6
Subject # 10	0	0	0	7

Performance on the Word Association Tasks

Total Number of Target Words Elicited as First Associates

	WAT 1		WAT 2	
	Critical	**Neutral**	**Critical**	**Neutral**
Low				
Subject # 1	3	2	3	1
Subject # 2	4	2	2	1
Subject # 3	5	4	5	1
Subject # 4	2	2	2	2
Subject # 5	2	0	3	0
Subject # 6	2	4	2	2
Subject # 7	0	0	1	1
Subject # 8	2	0	0	2
Subject # 9	3	3	0	2
Subject # 10	3	4	4	3
Medium				
Subject # 1	2	2	1	0
Subject # 2	2	1	1	1
Subject # 3	3	1	2	1
Subject # 4	2	1	3	4
Subject # 5	1	0	2	0
Subject # 6	0	1	0	1
Subject # 7	3	0	1	2
Subject # 8	3	2	3	0
Subject # 9	2	4	3	4
Subject # 10	0	0	0	0

	WAT 1		WAT 2	
	Critical	Neutral	Critical	Neutral
High				
Subject # 1	0	3	2	4
Subject # 2	3	1	4	3
Subject # 3	5	0	4	0
Subject # 4	2	3	4	2
Subject # 5	0	1	2	1
Subject # 6	0	0	0	1
Subject # 7	1	2	1	2
Subject # 8	5	3	3	3
Subject # 9	2	2	2	2
Subject # 10	1	0	1	0
Very high				
Subject # 1[b]	1	0	2	0
Subject # 2	4	2	4	1
Subject # 3	3	2	0	1
Subject # 4	2	4	6	4
Subject # 5	1	4	3	3
Subject # 6	2	3	5	5
Subject # 7[b]	3	4	4	3
Subject # 8	0	2	1	2
Subject # 9	1	0	1	0
Subject # 10	0	2	4	3
Simulator				
Subject # 1[b]	4	3	3	3
Subject # 2	0	0	2	0
Subject # 3	2	3	5	2
Subject # 4	1	4	2	4
Subject # 5	2	0	3	0
Subject # 6[b]	2	3	2	3
Subject # 7	1	2	1	3
Subject # 8	0	1	7	4
Subject # 9	0	4	2	5
Subject # 10	0	4	4	3

Performance on the Word Association Tasks

Total Number of Target Words Elicited as Second and Third Associates

	WAT 1		WAT 2	
	Critical	**Neutral**	**Critical**	**Neutral**
Low				
Subject # 1	2	2	1	1
Subject # 2	0	0	2	0
Subject # 3	1	0	1	2
Subject # 4	1	1	0	0
Subject # 5	1	1	0	1
Subject # 6	1	2	1	3
Subject # 7	0	2	0	0
Subject # 8	0	1	1	0
Subject # 9	1	1	0	1
Subject # 10	0	0	1	1
Medium				
Subject # 1	0	1	2	2
Subject # 2	0	1	0	0
Subject # 3	0	0	1	0
Subject # 4	0	0	0	1
Subject # 5	0	0	0	1
Subject # 6	0	0	0	1
Subject # 7	0	0	0	1
Subject # 8	1	0	0	2
Subject # 9	3	0	2	0
Subject # 10	0	0	1	1

	WAT 1		WAT 2	
	Critical	Neutral	Critical	Neutral
High				
Subject # 1	2	1	1	0
Subject # 2	0	2	0	0
Subject # 3	1	3	2	4
Subject # 4	0	1	2	1
Subject # 5	1	1	2	1
Subject # 6	1	1	1	0
Subject # 7	0	1	0	0
Subject # 8	0	0	0	0
Subject # 9	0	1	0	1
Subject # 10	0	0	0	0
Very high				
Subject # 1[b]	0	1	1	0
Subject # 2	0	1	0	3
Subject # 3	1	0	4	1
Subject # 4	0	1	1	2
Subject # 5	0	0	3	2
Subject # 6	0	1	0	0
Subject # 7[b]	1	0	2	0
Subject # 8	0	1	0	0
Subject # 9	0	0	1	0
Subject # 10	0	1	2	0
Simulator				
Subject # 1[b]	0	2	2	1
Subject # 2	2	0	1	0
Subject # 3	0	0	1	0
Subject # 4	1	0	2	0
Subject # 5	0	1	2	0
Subject # 6[b]	3	2	1	1
Subject # 7	2	0	1	0
Subject # 8	0	1	0	0
Subject # 9	1	1	1	1
Subject # 10	0	0	1	2

Performance on the Word Association Tasks

Total Number of Target Words Elicited as Continued Associates

	WAT 1		WAT 2	
	Critical	**Neutral**	**Critical**	**Neutral**
Low				
Subject # 1	5	4	4	2
Subject # 2	4	2	4	1
Subject # 3	6	4	6	3
Subject # 4	3	3	2	2
Subject # 5	3	1	3	1
Subject # 6	3	6	3	5
Subject # 7	0	2	1	1
Subject # 8	2	1	1	2
Subject # 9	4	4	0	3
Subject # 10	3	4	5	4
Medium				
Subject # 1	2	3	3	2
Subject # 2	2	2	1	1
Subject # 3	3	1	3	1
Subject # 4	2	1	4	4
Subject # 5	1	0	2	1
Subject # 6	0	1	0	2
Subject # 7	3	0	1	3
Subject # 8	4	2	3	2
Subject # 9	5	4	5	4
Subject # 10	0	0	1	1

	WAT 1		WAT 2	
	Critical	Neutral	Critical	Neutral
High				
Subject # 1	2	4	3	4
Subject # 2	3	3	4	3
Subject # 3	6	3	6	4
Subject # 4	2	4	6	3
Subject # 5	1	2	4	2
Subject # 6	1	1	1	1
Subject # 7	1	3	1	2
Subject # 8	5	3	3	3
Subject # 9	2	3	2	3
Subject # 10	1	0	1	0
Very high				
Subject # 1[b]	1	1	3	0
Subject # 2	4	3	4	4
Subject # 3	3	2	4	2
Subject # 4	2	5	7	6
Subject # 5	1	4	6	5
Subject # 6	2	4	5	5
Subject # 7[b]	4	4	6	3
Subject # 8	0	3	1	2
Subject # 9	1	0	2	0
Subject # 10	0	3	6	3
Simulator				
Subject # 1[b]	4	5	5	4
Subject # 2	2	0	3	0
Subject # 3	2	3	6	2
Subject # 4	2	4	4	4
Subject # 5	2	1	5	0
Subject # 6[b]	5	5	3	4
Subject # 7	3	2	2	3
Subject # 8	0	2	7	4
Subject # 9	1	5	3	6
Subject # 10	0	4	5	5

Performance on the Word Association Tasks

Total Number of Intrusions Elicited as First Associates

	WAT 1		WAT 2	
	Critical	**Neutral**	**Critical**	**Neutral**
Low				
Subject # 1	0	0	0	0
Subject # 2	0	0	0	0
Subject # 3	0	0	0	0
Subject # 4	0	1	0	0
Subject # 5	0	0	0	0
Subject # 6	0	0	0	0
Subject # 7	1	0	1	0
Subject # 8	0	0	0	0
Subject # 9	1	0	1	0
Subject # 10	0	0	0	1
Medium				
Subject # 1	0	0	0	0
Subject # 2	0	1	0	0
Subject # 3	1	0	0	1
Subject # 4	0	0	0	0
Subject # 5	0	0	0	0
Subject # 6	0	0	0	0
Subject # 7	0	0	0	0
Subject # 8	0	1	0	1
Subject # 9	0	0	0	1
Subject # 10	0	0	0	0

	WAT 1		WAT 2	
	Critical	Neutral	Critical	Neutral
High				
Subject # 1	0	0	1	0
Subject # 2	0	0	0	1
Subject # 3	1	0	1	0
Subject # 4	0	0	0	0
Subject # 5	0	0	0	0
Subject # 6	0	0	0	0
Subject # 7	0	1	0	0
Subject # 8	2	0	2	0
Subject # 9	0	0	0	0
Subject # 10	0	0	0	0
Very high				
Subject # 1[b]	0	2	0	0
Subject # 2	0	0	1	0
Subject # 3	0	1	0	0
Subject # 4	0	1	0	1
Subject # 5	0	1	0	1
Subject # 6	0	0	1	0
Subject # 7[b]	0	0	0	1
Subject # 8	0	0	2	0
Subject # 9	2	0	1	0
Subject # 10	0	1	0	0
Simulator				
Subject # 1[b]	0	0	0	0
Subject # 2	0	0	1	0
Subject # 3	0	0	0	1
Subject # 4	0	0	0	0
Subject # 5	0	0	1	0
Subject # 6[b]	1	0	1	0
Subject # 7	1	0	0	0
Subject # 8	0	0	0	0
Subject # 9	0	0	0	0
Subject # 10	0	0	0	0

Performance on the Word Association Tasks

Total Number of Intrusions Elicited as Second and Third Associates

	WAT 1		WAT 2	
	Critical	**Neutral**	**Critical**	**Neutral**
Low				
Subject # 1	0	0	1	0
Subject # 2	0	0	0	0
Subject # 3	0	0	0	0
Subject # 4	1	1	0	1
Subject # 5	0	0	0	0
Subject # 6	1	0	0	0
Subject # 7	0	0	1	0
Subject # 8	1	1	1	0
Subject # 9	0	0	2	0
Subject # 10	1	0	1	1
Medium				
Subject # 1	0	0	0	1
Subject # 2	1	0	1	0
Subject # 3	1	0	0	2
Subject # 4	0	0	1	0
Subject # 5	0	0	0	0
Subject # 6	0	0	0	0
Subject # 7	2	1	0	0
Subject # 8	1	0	0	0
Subject # 9	0	0	1	0
Subject # 10	1	0	0	0

	WAT 1		WAT 2	
	Critical	Neutral	Critical	Neutral
High				
Subject # 1	0	0	1	0
Subject # 2	1	0	1	0
Subject # 3	0	0	0	0
Subject # 4	0	0	0	0
Subject # 5	0	0	1	0
Subject # 6	1	0	1	0
Subject # 7	0	0	1	0
Subject # 8	0	0	0	0
Subject # 9	0	0	0	0
Subject # 10	0	0	0	0
Very high				
Subject # 1[b]	0	0	0	0
Subject # 2	0	0	3	0
Subject # 3	0	0	0	0
Subject # 4	0	1	1	1
Subject # 5	0	1	1	1
Subject # 6	0	1	1	0
Subject # 7[b]	1	1	0	0
Subject # 8	1	0	2	1
Subject # 9	0	0	0	0
Subject # 10	0	0	2	0
Simulator				
Subject # 1[b]	0	0	0	0
Subject # 2	0	0	0	0
Subject # 3	0	2	5	1
Subject # 4	0	0	0	0
Subject # 5	0	1	0	0
Subject # 6[b]	0	0	0	0
Subject # 7	0	0	4	0
Subject # 8	0	0	1	0
Subject # 9	0	0	1	1
Subject # 10	0	0	0	0

Performance on the Word Association Tasks

Total Number of Intrusions Elicited as Continued Associates

	WAT 1		WAT 2	
	Critical	Neutral	Critical	Neutral
Low				
Subject # 1	0	0	1	0
Subject # 2	0	0	0	0
Subject # 3	0	0	0	0
Subject # 4	1	2	0	1
Subject # 5	0	0	0	0
Subject # 6	1	0	0	0
Subject # 7	1	0	2	0
Subject # 8	1	1	1	0
Subject # 9	1	0	3	0
Subject # 10	1	0	1	2
Medium				
Subject # 1	0	0	0	1
Subject # 2	1	1	1	0
Subject # 3	2	0	0	3
Subject # 4	0	0	1	0
Subject # 5	0	0	0	0
Subject # 6	0	0	0	0
Subject # 7	2	1	0	0
Subject # 8	1	1	0	1
Subject # 9	0	0	1	1
Subject # 10	1	0	0	0

	WAT 1		WAT 2	
	Critical	Neutral	Critical	Neutral
High				
Subject # 1	0	0	2	0
Subject # 2	1	0	1	1
Subject # 3	1	0	1	0
Subject # 4	0	0	0	0
Subject # 5	0	0	1	0
Subject # 6	1	0	1	0
Subject # 7	0	1	1	0
Subject # 8	2	0	2	0
Subject # 9	0	0	0	0
Subject # 10	0	0	0	0
Very high				
Subject # 1[b]	0	2	0	0
Subject # 2	0	0	4	0
Subject # 3	0	1	0	0
Subject # 4	0	2	1	2
Subject # 5	0	2	1	2
Subject # 6	0	1	2	0
Subject # 7[b]	1	1	0	1
Subject # 8	1	0	4	1
Subject # 9	2	0	1	0
Subject # 10	0	1	2	0
Simulator				
Subject # 1[b]	0	0	0	0
Subject # 2	0	0	1	0
Subject # 3	0	2	5	2
Subject # 4	0	0	0	0
Subject # 5	0	1	1	0
Subject # 6[b]	1	0	1	0
Subject # 7	1	0	4	0
Subject # 8	0	0	1	0
Subject # 9	0	0	1	1
Subject # 10	0	0	0	0

Performance on the Word Association Tasks

Total Number of Target Words + Intrusions Elicited as First Associates

	WAT 1		WAT 2	
	Critical	**Neutral**	**Critical**	**Neutral**
Low				
Subject # 1	3	2	3	1
Subject # 2	4	2	2	1
Subject # 3	5	4	5	1
Subject # 4	2	3	2	2
Subject # 5	2	0	3	0
Subject # 6	2	4	2	2
Subject # 7	1	0	2	1
Subject # 8	2	0	0	2
Subject # 9	4	3	1	2
Subject # 10	3	4	4	4
Medium				
Subject # 1	2	2	1	0
Subject # 2	2	2	1	1
Subject # 3	4	1	2	2
Subject # 4	2	1	3	4
Subject # 5	1	0	2	0
Subject # 6	0	1	0	1
Subject # 7	3	0	1	2
Subject # 8	3	3	3	1
Subject # 9	2	4	3	5
Subject # 10	0	0	0	0

	WAT 1		WAT 2	
	Critical	Neutral	Critical	Neutral
High				
Subject # 1	0	3	3	4
Subject # 2	3	1	4	4
Subject # 3	6	0	5	0
Subject # 4	2	3	4	2
Subject # 5	0	1	2	1
Subject # 6	0	0	0	1
Subject # 7	1	3	1	2
Subject # 8	7	3	5	3
Subject # 9	2	2	2	2
Subject # 10	1	0	1	0
Very high				
Subject # 1[b]	1	2	2	0
Subject # 2	4	2	5	1
Subject # 3	2	3	0	1
Subject # 4	2	5	6	5
Subject # 5	1	5	3	4
Subject # 6	2	3	6	5
Subject # 7[b]	3	4	4	4
Subject # 8	0	2	3	2
Subject # 9	3	0	2	0
Subject # 10	0	3	4	3
Simulator				
Subject # 1[b]	4	3	3	3
Subject # 2	0	0	3	0
Subject # 3	2	3	5	3
Subject # 4	1	4	2	4
Subject # 5	2	0	4	0
Subject # 6[b]	3	3	3	3
Subject # 7	2	2	1	3
Subject # 8	0	1	7	4
Subject # 9	0	4	2	5
Subject # 10	0	4	4	3

Performance on the Word Association Tasks

Total Number of Target Words + Intrusions Elicited as Second and Third Associates

	WAT 1		WAT 2	
	Critical	Neutral	Critical	Neutral
Low				
Subject # 1	2	2	2	1
Subject # 2	0	0	2	0
Subject # 3	1	0	1	2
Subject # 4	2	2	0	1
Subject # 5	1	1	0	1
Subject # 6	2	2	1	3
Subject # 7	0	2	1	0
Subject # 8	1	2	2	0
Subject # 9	1	1	2	1
Subject # 10	1	0	2	2
Medium				
Subject # 1	0	1	2	3
Subject # 2	1	1	1	0
Subject # 3	1	0	1	2
Subject # 4	0	0	2	0
Subject # 5	0	0	0	1
Subject # 6	0	0	0	1
Subject # 7	2	1	0	1
Subject # 8	2	0	0	2
Subject # 9	3	0	3	0
Subject # 10	1	0	1	1

	WAT 1		WAT 2	
	Critical	Neutral	Critical	Neutral
High				
Subject # 1	2	1	2	0
Subject # 2	1	2	1	0
Subject # 3	1	3	2	4
Subject # 4	0	1	2	1
Subject # 5	1	1	3	1
Subject # 6	2	1	2	0
Subject # 7	0	1	1	0
Subject # 8	0	0	0	0
Subject # 9	0	1	0	1
Subject # 10	0	0	0	0
Very high				
Subject # 1[b]	0	1	1	0
Subject # 2	0	1	3	3
Subject # 3	1	0	4	1
Subject # 4	0	2	2	3
Subject # 5	0	1	4	3
Subject # 6	0	2	1	0
Subject # 7[b]	2	1	2	0
Subject # 8	1	1	2	1
Subject # 9	0	0	1	0
Subject # 10	0	1	4	0
Simulator				
Subject # 1[b]	0	2	2	1
Subject # 2	2	0	1	0
Subject # 3	0	2	6	1
Subject # 4	1	0	2	0
Subject # 5	0	2	2	0
Subject # 6[b]	3	2	1	1
Subject # 7	2	0	5	0
Subject # 8	0	1	1	0
Subject # 9	1	1	2	2
Subject # 10	0	0	1	2

Performance on the Word Association Tasks

Total Number of Target Words + Intrusions Elicited as Continued Associates

	WAT 1		WAT 2	
	Critical	**Neutral**	**Critical**	**Neutral**
Low				
Subject # 1	5	4	5	2
Subject # 2	4	2	4	1
Subject # 3	6	4	6	3
Subject # 4	4	5	2	3
Subject # 5	3	1	3	1
Subject # 6	4	6	3	5
Subject # 7	1	2	3	1
Subject # 8	3	2	2	2
Subject # 9	5	4	3	3
Subject # 10	4	4	6	6
Medium				
Subject # 1	2	3	3	3
Subject # 2	3	3	2	1
Subject # 3	5	1	3	4
Subject # 4	2	1	5	4
Subject # 5	1	0	2	1
Subject # 6	0	1	0	2
Subject # 7	5	1	1	3
Subject # 8	5	3	3	3
Subject # 9	5	4	6	5
Subject # 10	1	0	1	1

	WAT 1		WAT 2	
	Critical	Neutral	Critical	Neutral
High				
Subject # 1	2	4	5	4
Subject # 2	4	3	5	4
Subject # 3	7	3	7	4
Subject # 4	2	4	6	3
Subject # 5	1	2	5	2
Subject # 6	2	1	2	1
Subject # 7	1	4	2	2
Subject # 8	7	3	5	3
Subject # 9	2	3	2	3
Subject # 10	1	0	1	0
Very high				
Subject # 1[b]	1	3	3	0
Subject # 2	4	3	8	4
Subject # 3	3	3	4	2
Subject # 4	2	7	8	8
Subject # 5	1	6	7	7
Subject # 6	2	5	7	5
Subject # 7[b]	5	5	6	4
Subject # 8	1	3	5	3
Subject # 9	3	0	3	0
Subject # 10	0	4	8	3
Simulator				
Subject # 1[b]	4	5	5	4
Subject # 2	2	0	4	0
Subject # 3	2	5	11	4
Subject # 4	2	4	4	4
Subject # 5	2	2	6	0
Subject # 6[b]	6	5	4	4
Subject # 7	4	2	6	3
Subject # 8	0	2	8	4
Subject # 9	1	5	4	7
Subject # 10	0	4	5	5

Performance on the Word Association Tasks

Response Latency (in seconds) of First Associates Elicited to the Critical Versus Neutral Stimuli

	WAT 1		WAT 2	
	Critical	**Neutral**	**Critical**	**Neutral**
Low				
Subject # 1	2.44	1.41	1.99	1.53
Subject # 2	1.88	1.59	1.75	1.70
Subject # 3	2.02	2.65	1.94	1.60
Subject # 4	2.30	1.70	1.74	2.24
Subject # 5	1.56	1.64	1.19	1.17
Subject # 6	1.36	1.43	1.16	1.58
Subject # 7	3.02	10.71	1.74	2.17
Subject # 8	7.27	10.61	5.44	6.67
Subject # 9	1.52	2.55	2.65	2.50
Subject # 10	1.28	1.39	1.17	2.22
Medium				
Subject # 1	3.31	2.13	2.35	2.45
Subject # 2	2.95	2.75	4.16	2.88
Subject # 3	1.61	1.73	1.67	2.36
Subject # 4	2.66	7.15	1.31	1.24
Subject # 5	2.01	1.60	3.08	2.27
Subject # 6	2.96	3.40	2.55	3.55
Subject # 7	1.78	1.66	1.30	1.28
Subject # 8	1.27	1.85	1.57	2.20
Subject # 9	1.27	1.25	1.36	1.33
Subject # 10	2.01	1.47	2.31	2.19

	WAT 1		WAT 2	
	Critical	Neutral	Critical	Neutral
High				
Subject # 1	8.98	4.12	2.24	2.53
Subject # 2	1.39	1.28	1.73	1.58
Subject # 3	1.54	1.47	1.26	1.43
Subject # 4	2.11	2.12	2.12	1.90
Subject # 5	2.40	2.07	2.71	2.58
Subject # 6	3.72	3.23	2.42	2.65
Subject # 7	1.48	2.23	1.97	2.41
Subject # 8	1.10	1.20	0.89	0.98
Subject # 9	2.14	2.49	1.77	1.64
Subject # 10	2.70	1.75	1.50	1.16
Very high				
Subject # 1[b]	2.51	3.34	2.31	4.07
Subject # 2	1.31	1.18	1.69	1.50
Subject # 3[c]	9.64	4.28	4.77	2.67
Subject # 4	2.61	1.66	1.21	2.21
Subject # 5	2.23	2.64	2.74	2.53
Subject # 6	2.55	1.95	1.45	1.12
Subject # 7[b]	2.72	1.89	1.56	1.40
Subject # 8	2.45	1.35	1.86	1.37
Subject # 9	2.24	2.36	2.50	2.48
Subject # 10	1.38	2.13	1.49	1.85
Simulator				
Subject # 1[b]	1.81	1.36	1.35	1.36
Subject # 2	8.22	7.58	4.20	5.44
Subject # 3	2.92	1.72	1.98	2.28
Subject # 4	3.32	1.95	1.69	1.92
Subject # 5	3.09	2.28	1.73	1.54
Subject # 6[b]	2.90	2.02	1.80	1.65
Subject # 7	1.42	1.71	1.20	1.35
Subject # 8	3.28	3.38	1.00	2.24
Subject # 9	2.09	1.58	1.91	1.68
Subject # 10	2.11	5.21	1.52	1.44

Performance on the Word Association Tasks

Response Latency (in seconds) of Second and Third Associates Elicited to the Critical Versus Neutral Stimuli

	WAT 1		WAT 2	
	Critical	Neutral	Critical	Neutral
Low				
Subject # 1	2.04	1.40	3.04	2.29
Subject # 2	1.47	2.05	1.90	1.49
Subject # 3	2.85	1.84	2.55	1.41
Subject # 4	1.90	2.14	1.92	1.90
Subject # 5	2.56	1.88	1.93	2.11
Subject # 6	2.80	2.28	1.45	1.87
Subject # 7	3.02	4.34	3.34	4.02
Subject # 8	4.71	7.48	6.54	4.60
Subject # 9	1.48	1.85	2.05	2.20
Subject # 10	1.82	2.32	1.85	2.01
Medium				
Subject # 1	5.15	3.74	4.67	3.97
Subject # 2	6.31	3.01	2.43	3.34
Subject # 3	0.85	1.22	1.38	1.68
Subject # 4	3.85	5.21	3.38	4.58
Subject # 5	2.93	1.98	1.90	2.23
Subject # 6	2.66	2.41	2.50	2.53
Subject # 7	3.38	3.30	2.48	2.43
Subject # 8	2.70	3.97	3.27	3.78
Subject # 9	1.60	1.72	1.72	1.52
Subject # 10	3.05	2.64	2.92	3.12

	WAT 1		WAT 2	
	Critical	Neutral	Critical	Neutral
High				
Subject # 1	8.46	6.93	7.02	6.20
Subject # 2	2.90	0.87	1.20	1.01
Subject # 3	2.33	1.52	1.96	2.11
Subject # 4	6.51	4.38	5.80	3.80
Subject # 5	4.65	4.25	3.04	2.88
Subject # 6	8.14	6.89	6.74	6.23
Subject # 7	3.40	3.12	2.60	2.70
Subject # 8	1.39	1.73	1.58	1.62
Subject # 9	4.33	4.38	4.04	5.18
Subject # 10	3.01	2.91	3.08	3.59
Very high				
Subject # 1[b]	4.39	3.25	3.80	4.09
Subject # 2	4.21	3.52	3.84	4.52
Subject # 3[c]	19.75	10.78	19.96	4.60
Subject # 4	4.48	2.57	3.41	2.76
Subject # 5	4.04	5.30	3.94	3.47
Subject # 6	5.16	4.59	1.91	2.69
Subject # 7[b]	3.94	3.96	3.38	2.53
Subject # 8	2.00	2.58	2.63	2.79
Subject # 9	4.29	3.41	3.33	2.92
Subject # 10	1.42	1.61	2.12	2.53
Simulator				
Subject # 1[b]	2.55	1.93	1.69	1.49
Subject # 2	6.47	4.34	5.85	4.45
Subject # 3	2.65	2.26	3.05	2.98
Subject # 4	2.97	2.05	1.81	1.93
Subject # 5	3.41	2.99	2.93	2.90
Subject # 6[b]	2.76	2.80	2.01	1.80
Subject # 7	1.48	1.83	1.37	1.33
Subject # 8	4.25	4.03	4.12	3.73
Subject # 9	2.82	2.63	2.62	3.09
Subject # 10	1.38	2.87	1.63	1.41

Performance on the Word Association Tasks

Response Latency (in seconds) of Continued Associates Elicited to the Critical Versus Neutral Stimuli

	WAT 1		WAT 2	
	Critical	**Neutral**	**Critical**	**Neutral**
Low				
Subject # 1	2.17	1.40	2.69	2.04
Subject # 2	1.61	1.90	1.85	1.56
Subject # 3	2.57	2.11	2.35	1.47
Subject # 4	2.03	1.99	1.86	2.01
Subject # 5	2.23	1.80	1.68	1.80
Subject # 6	2.32	2.00	1.36	1.78
Subject # 7	3.02	6.46	2.81	3.41
Subject # 8	5.56	8.52	6.17	5.29
Subject # 9	1.49	2.08	2.25	2.30
Subject # 10	1.64	2.01	1.62	2.08
Medium				
Subject # 1	4.53	3.20	3.89	3.47
Subject # 2	5.19	2.92	3.01	3.18
Subject # 3	1.10	1.39	1.47	1.90
Subject # 4	3.45	5.86	2.69	3.46
Subject # 5	2.62	1.85	2.29	2.24
Subject # 6	2.76	2.74	2.51	2.87
Subject # 7	2.85	2.76	2.08	2.05
Subject # 8	2.22	3.26	2.71	3.25
Subject # 9	1.49	1.56	1.60	1.45
Subject # 10	2.70	2.25	2.72	2.81

	WAT 1		WAT 2	
	Critical	Neutral	Critical	Neutral
High				
Subject # 1	8.64	5.99	5.43	4.97
Subject # 2	2.40	1.01	1.38	1.20
Subject # 3	2.07	1.51	1.73	1.88
Subject # 4	5.04	3.62	4.57	3.17
Subject # 5	3.90	3.52	2.95	2.78
Subject # 6	6.67	5.67	5.30	5.03
Subject # 7	2.76	2.82	2.39	2.61
Subject # 8	1.30	1.56	1.35	1.40
Subject # 9	3.60	3.75	3.28	4.00
Subject # 10	2.91	2.52	2.56	2.78
Very high				
Subject # 1[b]	3.77	3.28	3.30	4.08
Subject # 2	3.24	2.74	3.12	3.51
Subject # 3[c]	16.38	8.61	14.90	3.96
Subject # 4	3.86	2.26	2.68	2.57
Subject # 5	3.43	4.41	3.54	3.15
Subject # 6	4.29	3.71	1.76	2.17
Subject # 7[b]	3.54	3.27	2.78	2.15
Subject # 8	2.15	2.17	2.38	2.32
Subject # 9	3.60	3.06	3.05	2.77
Subject # 10	1.41	1.79	1.91	2.30
Simulator				
Subject # 1[b]	2.30	1.74	1.58	1.44
Subject # 2	7.06	5.42	5.30	4.78
Subject # 3	2.74	2.08	2.69	2.75
Subject # 4	3.08	2.02	1.77	1.93
Subject # 5	3.30	2.76	2.53	2.44
Subject # 6[b]	2.80	2.54	1.94	1.75
Subject # 7	1.46	1.79	1.31	1.33
Subject # 8	3.93	3.81	3.08	3.23
Subject # 9	2.58	2.28	2.38	2.62
Subject # 10	1.62	3.65	1.60	1.42

Performance on the Word Association Tasks

Response Latency (in seconds) of Critical Versus Neutral Target Words Elicited as First Associates

	WAT 1		WAT 2	
	Critical	**Neutral**	**Critical**	**Neutral**
Low				
Subject # 1	2.44	1.65	2.44	0.77
Subject # 2	2.17	1.15	1.14	1.21
Subject # 3	2.04	1.72	1.87	1.40
Subject # 4	2.35	1.79	1.14	1.22
Subject # 5	2.01	-	1.15	-
Subject # 6	1.02	1.03	1.09	1.31
Subject # 7	-	-	0.84	1.85
Subject # 8	8.49	-	-	4.51
Subject # 9	1.76	2.09	-	1.83
Subject # 10	1.46	1.29	1.14	1.24
Medium				
Subject # 1	1.53	1.36	0.88	-
Subject # 2	1.73	1.40	1.41	1.60
Subject # 3	1.07	2.17	1.37	2.75
Subject # 4	2.64	4.29	0.98	1.12
Subject # 5	3.52	-	1.87	-
Subject # 6	-	3.75	-	2.05
Subject # 7	2.22	-	1.53	1.76
Subject # 8	0.84	1.08	1.18	-
Subject # 9	0.93	0.81	0.96	1.05
Subject # 10	-	-	-	-

	WAT 1		WAT 2	
	Critical	Neutral	Critical	Neutral
High				
Subject # 1	-	4.32	0.92	2.47
Subject # 2	1.31	1.10	1.41	1.33
Subject # 3	1.60	-	1.38	-
Subject # 4	1.49	1.40	2.04	1.19
Subject # 5	-	1.88	2.52	2.27
Subject # 6	-	-	-	1.19
Subject # 7	1.13	0.95	1.57	0.84
Subject # 8	1.06	0.85	0.81	0.99
Subject # 9	1.60	1.42	2.10	1.27
Subject # 10	1.26	-	0.92	-
Very high				
Subject # 1[b]	1.84	-	3.21	-
Subject # 2	1.23	1.08	1.27	0.83
Subject # 3[c]	3.41	2.73	-	2.16
Subject # 4	1.52	1.53	1.14	2.05
Subject # 5	2.52	2.30	1.21	2.40
Subject # 6	1.71	1.67	0.90	1.16
Subject # 7[b]	2.60	2.26	1.50	0.92
Subject # 8	-	1.06	1.13	0.75
Subject # 9	1.84	-	1.09	-
Subject # 10	-	1.42	1.23	1.41
Simulator				
Subject # 1[b]	1.13	1.19	1.28	1.19
Subject # 2	-	-	3.89	-
Subject # 3	1.24	1.80	1.69	1.27
Subject # 4	7.09	1.81	1.11	1.78
Subject # 5	1.55	-	1.71	-
Subject # 6[b]	4.61	2.32	1.08	1.44
Subject # 7	1.20	1.31	1.09	1.36
Subject # 8	-	1.77	1.00	1.27
Subject # 9	-	1.57	1.45	1.55
Subject # 10	-	7.90	1.51	1.42

Performance on the Word Association Tasks

Response Latency (in seconds) of Critical Versus Neutral Target Words Elicited as Continued Associates

	WAT 1		WAT 2	
	Critical	**Neutral**	**Critical**	**Neutral**
Low				
Subject # 1	2.16	1.19	3.02	1.36
Subject # 2	2.17	1.15	1.62	1.21
Subject # 3	1.75	1.72	1.82	1.14
Subject # 4	1.93	1.83	1.14	1.22
Subject # 5	1.73	2.21	1.15	1.81
Subject # 6	1.65	1.35	1.02	2.17
Subject # 7	-	3.42	0.84	1.85
Subject # 8	8.49	0.60	23.37	4.51
Subject # 9	1.65	2.27	-	1.96
Subject # 10	1.46	1.29	1.10	1.57
Medium				
Subject # 1	1.53	1.46	2.96	2.61
Subject # 2	1.73	1.77	1.41	1 60
Subject # 3	1.07	2.17	1.49	2.75
Subject # 4	2.64	4.29	1.25	1.12
Subject # 5	3.52	-	1.87	1.99
Subject # 6	-	3.75	-	2.44
Subject # 7	2.22	-	1.53	1.78
Subject # 8	1.32	1.08	1.18	2.55
Subject # 9	1.40	0.81	1.21	1.05
Subject # 10	-	-	2.49	2.48

	WAT 1		WAT 2	
	Critical	Neutral	Critical	Neutral
High				
Subject # 1	5.27	5.77	3.11	2.47
Subject # 2	1.31	0.65	1.41	1.33
Subject # 3	1.45	1.47	1.46	2.12
Subject # 4	1.49	2.22	3.01	1.72
Subject # 5	2.34	2.57	2.88	3.27
Subject # 6	4.06	9.21	5.50	1.19
Subject # 7	1.13	2.12	1.57	0.84
Subject # 8	1.06	0.85	0.81	0.99
Subject # 9	1.60	1.40	2.10	2.08
Subject # 10	1.26	-	0.92	-
Very high				
Subject # 1[b]	1.84	2.21	3.53	-
Subject # 2	1.23	2.99	1.27	2.77
Subject # 3[c]	3.42	2.73	53.43	1.59
Subject # 4	1.52	2.49	1.21	2.60
Subject # 5	2.52	2.30	2.28	2.65
Subject # 6	1.71	2.34	0.90	1.16
Subject # 7[b]	3.35	2.26	2.17	0.92
Subject # 8	-	1.05	1.13	0.75
Subject # 9	1.84	-	4.55	-
Subject # 10	-	1.32	1.49	1.41
Simulator				
Subject # 1[b]	1.13	1.38	1.45	1.40
Subject # 2	10.50	-	4.91	-
Subject # 3	1.24	1.80	1.73	1.27
Subject # 4	4.69	1.81	1.46	1.78
Subject # 5	1.55	3.63	2.22	-
Subject # 6[b]	4.39	2.62	1.08	1.41
Subject # 7	1.34	1.31	0.90	1.36
Subject # 8	-	3.31	1.00	1.27
Subject # 9	1.29	1.50	1.90	1.56
Subject # 10	-	7.90	1.77	1.16

Performance on the Word Association Tasks

Response Latency (in seconds) of Critical Versus Neutral Target Words + Intrusions Elicited as First Associates

	WAT 1		WAT 2	
	Critical	**Neutral**	**Critical**	**Neutral**
Low				
Subject # 1	2.44	1.65	2.44	0.77
Subject # 2	2.17	1.15	1.14	1.21
Subject # 3	2.04	1.72	1.87	1.40
Subject # 4	2.35	1.56	1.14	1.22
Subject # 5	2.01	-	1.15	-
Subject # 6	1.02	1.03	1.09	1.31
Subject # 7	1.52	-	1.60	1.85
Subject # 8	8.49	-	-	4.51
Subject # 9	1.80	2.09	1.50	1.83
Subject # 10	1.46	1.29	1.14	1.46
Medium				
Subject # 1	1.53	1.36	0.88	-
Subject # 2	1.73	1.42	1.41	1.60
Subject # 3	1.16	2.17	1.37	2.08
Subject # 4	2.64	4.29	0.98	1.12
Subject # 5	3.52	-	1.87	-
Subject # 6	-	3.75	-	2.05
Subject # 7	2.22	-	1.53	1.76
Subject # 8	0.84	1.27	1.18	2.06
Subject # 9	0.93	0.81	0.96	1.28
Subject # 10	-	-	-	-

	WAT 1		WAT 2	
	Critical	Neutral	Critical	Neutral
High				
Subject # 1	-	4.32	2.97	2.47
Subject # 2	1.31	1.10	1.41	1.64
Subject # 3	1.92	-	1.70	-
Subject # 4	1.49	1.40	2.04	1.19
Subject # 5	-	1.88	2.52	2.27
Subject # 6	-	-	-	1.19
Subject # 7	1.13	1.17	1.57	0.84
Subject # 8	1.10	0.85	0.90	0.99
Subject # 9	1.60	1.42	2.10	1.27
Subject # 10	1.26	-	0.92	-
Very high				
Subject # 1[b]	1.84	3.20	3.21	-
Subject # 2	1.23	1.08	1.50	0.83
Subject # 3[c]	3.41	5.95	-	2.16
Subject # 4	1.52	1.69	1.14	1.97
Subject # 5	2.52	2.56	1.21	2.51
Subject # 6	1.71	1.67	0.95	1.16
Subject # 7[b]	2.60	2.26	1.50	1.14
Subject # 8	-	1.06	1.22	0.75
Subject # 9	2.46	-	1.29	-
Subject # 10	-	1.38	1.23	1.41
Simulator				
Subject # 1[b]	1.13	1.19	1.28	1.19
Subject # 2	-	-	3.91	-
Subject # 3	1.24	1.80	1.69	1.58
Subject # 4	7.09	1.81	1.11	1.78
Subject # 5	1.55	-	1.91	-
Subject # 6[b]	3.39	2.32	0.97	1.44
Subject # 7	1.32	1.31	1.09	1.36
Subject # 8	-	1.77	1.00	1.27
Subject # 9	-	1.57	1.45	1.55
Subject # 10	-	7.90	1.51	1.42

Performance on the Word Association Tasks

Response Latency (in seconds) of Critical Versus Neutral Target Words + Intrusions Elicited as Continued Associates

	WAT 1		WAT 2	
	Critical	**Neutral**	**Critical**	**Neutral**
Low				
Subject # 1	2.16	1.19	2.65	1.36
Subject # 2	2.17	1.15	1.62	1.21
Subject # 3	1.75	1.72	1.82	1.14
Subject # 4	2.18	1.75	1.14	1.51
Subject # 5	1.73	2.21	1.15	1.81
Subject # 6	1.88	1.35	1.02	2.17
Subject # 7	1.52	3.42	1.89	1.85
Subject # 8	8.33	1.21	8.31	4.51
Subject # 9	1.71	2.27	1.84	1.96
Subject # 10	1.41	1.29	1.20	1.62
Medium				
Subject # 1	1.53	1.46	2.96	3.23
Subject # 2	7.56	1.66	2.91	1.60
Subject # 3	1.04	2.17	1.49	1.28
Subject # 4	2.64	4.29	1.76	1.12
Subject # 5	3.52	-	1.87	1.99
Subject # 6	-	3.75	-	2.44
Subject # 7	2.37	1.54	1.53	1.78
Subject # 8	1.72	1.27	1.18	2.38
Subject # 9	1.40	0.81	1.27	1.28
Subject # 10	4.26	-	2.49	2.48

	WAT 1		WAT 2	
	Critical	Neutral	Critical	Neutral
High				
Subject # 1	5.27	5.77	4.34	2.47
Subject # 2	1.16	0.65	1.30	1.64
Subject # 3	1.74	1.47	1.68	2.12
Subject # 4	1.49	2.22	3.01	1.72
Subject # 5	2.34	2.57	2.93	3.27
Subject # 6	4.24	9.21	5.85	1.19
Subject # 7	1.13	1.99	1.90	0.84
Subject # 8	1.10	0.85	0.90	0.99
Subject # 9	1.60	1.40	2.10	2.08
Subject # 10	1.26	-	0.92	-
Very high				
Subject # 1[b]	1.84	2.87	3.53	-
Subject # 2	1.23	2.99	2.30	2.77
Subject # 3[c]	3.42	5.95	53.43	1.59
Subject # 4	1.52	2.43	1.30	2.36
Subject # 5	2.52	2.58	2.67	2.86
Subject # 6	1.71	2.10	1.09	1.16
Subject # 7[b]	3.50	2.73	2.17	1.14
Subject # 8	1.57	1.05	3.10	1.18
Subject # 9	2.46	-	3.53	-
Subject # 10	-	1.32	1.65	1.41
Simulator				
Subject # 1[b]	1.13	1.38	1.45	1.40
Subject # 2	10.50	-	4.67	-
Subject # 3	1.24	1.89	2.30	2.50
Subject # 4	4.69	1.81	1.46	1.78
Subject # 5	1.55	2.46	2.26	-
Subject # 6[b]	3.82	2.62	1.00	1.41
Subject # 7	1.36	1.31	0.94	1.36
Subject # 8	-	3.31	1.23	1.27
Subject # 9	1.29	1.50	1.77	1.59
Subject # 10	-	7.90	1.77	1.16

[a] The first five subjects listed for each group learned List 1; the remaining five subjects learned List 2.

[b] Amnesia outliers. Not included into the analyses of WAT scores.

[c] Response latency outlier. Not included into the analyses of WAT/RL scores.